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This Week

Use of infinitely variable transmissions on American cars is a step nearer attainment this week with the announcement by Bendix of a hydro-mechanical unit. Complete description, by Adiel Y. Dodge, Bendix consulting engineer, appears on page 50.

The automobile industry has had more than its share of *causes celebres* in the field of patents. Some of them are recalled and your knowledge of the industry's patent position brought up to date in an article by P. M. Heldt, signaling the hundredth anniversary of the present Patent Office system. Turn to page 46.

Important labor developments are discussed on page 55 by J. S. Lawrence, and at several places in the news section.

Macauley to Speak At A.M.A. Drawing

Applications for space on the first and second floors of the forthcoming National Automobile Show at the Grand Central Palace in New York more than cover the available footage, according to the Automobile Manufacturers Association.

Drawings for exhibit position at the National Shows will be held in Detroit Wednesday, July 15, at the annual meeting of the A.M.A., during which Alvan Macauley, president of Packard and of the association will review the recovery progress of the motor-vehicle industry. Several other top executives of the industry are scheduled to speak.

Graham Sells Machinery For Datsun Production

Graham-Paige Motors Corp. has disposed of an entire line of machinery used in the manufacture of its discontinued 6-cylinder engines to Nissan Jidosha Kaisha, maker of the "Datsun" Japanese baby-cars. The deal involved \$200,000. Reports that the Japanese firm was to be licensed to build Graham cars and trucks were denied by Graham officials.

June Estimates Shattered

**470,000 Motor Vehicles Top All But 1929
Production Records; Quarter is Third Best**

By HAROLD E. GRONSETH

Repeated advances in production schedules of leading manufacturers last month lifted the June output of the motor industry far beyond original estimates. On the basis of the report of the Automobile Manufacturers Association, showing 367,303 cars and trucks built by members, a closer estimate can now be made for the industry as a whole. The final June figure is expected to show upwards of 470,000 units built in the U. S. and Canada, or within 10,000 units of the May production which totaled 480,571 vehicles. This compares with 372,085 units turned out in June last year. For A.M.A. members it was the best June in history, but because of heavier Ford production in 1929, June of that year was the biggest for the industry having a total of 567,424 vehicles.

Over 2,595,000 cars and trucks were turned out by the industry in the first six months of 1936, of which 1,117,125 were built in the first quarter and upwards of 1,478,000 in the second quarter, making that period the third best in history, exceeded only by the first and second quarters of the peak year 1929.

Continued strength of retail demand and anticipated stimulus from veterans' bonus money prompted several of the leading manufacturers to make eleventh hour increases in their material commitments for the balance of the 1936 run. One of the volume producers added 25,000 units to its original schedule for the balance of the model year. Several plants that had started June on a four-day week returned to a five-day basis in the course of the month. Some tapering off is indicated for July but as yet operations have held close to the June level, and an output of over 400,000 vehicles is indicated for the current month.

The marvel of this year's motor business is the steadiness of retail demand throughout the second quarter. After hitting the seasonal peak in April, sales have clung persistently

near that level right through the three months' period. The top for deliveries in the domestic market was 456,500 in April. May fell short of that volume by fewer than 1000 units, and now June appears likely to come within 2000 units of the May figure.

The palm goes to the volume producers who either established new high marks in June or showed a steady climb as the season advanced. Chevrolet set an all-time record for June deliveries and Plymouth is believed to have done the same. Ford reversed the seasonal trend by delivering more vehicles in June than in May and more in May than in April.

A 25 per cent sales gain for the first five months was reported this week by the Edward G. Budd Mfg. Co. This represented the largest sales for the period since 1930. Not included in the (Turn to page 43, please)

Nash Turns Loss to Profit; Gar Wood Industries Gains

The Nash Motor Co. reported this week a net earning for the quarter ending May 31 of \$353,516 after deduction for expenses and provision for taxes. This contrasts with a net loss during the same period in 1935 of \$556,310 and a net profit during the first quarter of the current fiscal year of \$72,372.

The company's balance sheet on May 31 showed assets of \$28,200,714 against current liabilities of \$2,395,623. The regular quarterly dividend of 25 cents a share on the common stock was declared payable on Aug. 1 to holders of record July 18.

Gar Wood Industries, Inc., and subsidiaries report earnings for the second quarter in excess of \$450,000 before provision for Federal taxes. Earnings on the same basis for the first quarter totaled \$165,080, and profits for the entire year 1935, after taxes, amounted to \$684,307.

Motors Exhibit at Cleveland

*Great Lakes Exposition Houses Car, Truck and Parts
Displays in the Automotive Building*

The automotive building at the Great Lakes Exposition in Cleveland is proving to be one of the main features of the colorful event which is drawing a daily average attendance of 30,000 visitors. All the automotive exhibits are housed in one glittering building painted red, white and blue and topped with huge pylons rising above it.

Cars on exhibition include the products of General Motors, Ford, Chrysler, White Motors, and Studebaker. In the same building there are shown the latest boat models by Chris Craft, tractors by Cletrac and industrial exhibits by Thompson Products Co., Timken Roller Bearing Co., Republic Steel Corp., American Rolling Mills and Willard Storage Battery.

Chrysler products are shown in an elaborate, formal English garden complete with growing shrubs and trees, surrounding a picturesque water fountain and fish pool. The setting was designed by Thomas L. Berry, noted landscape engineer. Full-grown evergreen trees and high formal hedges conceal the walls, while the ceiling is hidden by lattice work covered by vines and wisteria blossoms.

The Ford exhibit includes a large floor space embracing a model of the Ford wood distillation plant, a motor assembly demonstration and a revolving cut-away chassis. Machines are set up in one section where young men receive actual training at machines in the exhibit of the Henry Ford Trade School. The color background of the Ford show is red, white and blue.

General Motors has a large and colorful exhibit. All models are on display with a prominent place given a Winton Diesel engine, similar to the one used to power the Burlington's Zephyr. Gen-

eral Motors also has a large truck display and a demonstration of knee-action and brake control. The G. M. display is set off against a bright and elaborate purple and a yellow flower decoration with shrubbery and evergreens along the walls.

With the gay colors of the flags of all nations hanging from wall stanchions, Studebaker has a complete exhibit and one drawing large crowds. Side by side with the newest models stand famous old carriages, coaches and broughams of pre-automobile days. Great crowds have given special attention to the old coach presented to the Marquis de Lafayette by the United States Government, President Lincoln's state carriage and the coaches of other

(Turn to page 42, please)



K. B. ELLIOTT
recently elected vice-president
of the Studebaker Corp.

AMA Reports June All-Time Record

*Members Shipments Show Gain of 34 Per Cent for Month
While First Half Output Nears Two Million Mark*

Members of the Automobile Manufacturers Association shipped more motor vehicles in June than in any previous June in the history of the organization, according to the association's preliminary estimates released this week.

June factory sales of members was estimated at 367,303 units, an increase of 34 per cent over June a year ago and only 2 per cent under May.

Shipments for the first six months totaled 1,963,422 units, an increase of 28 per cent over the same period last year. The association's report, which

covers all manufacturers but Ford, is summarized as follows:

June, 1936	367,303
May, 1936	375,032
June, 1935	274,093
6 Months, 1936	1,963,422
6 Months, 1935	1,535,761

ASI Show Rules

*Jobber Members Only Admitted
First 2 Days, Guests Last 3*

The Joint Operating Committee's plans for the annual Automotive Service Industries Show, to be held in the Navy Pier, Chicago, Dec. 9-13, inclusive, are rapidly taking shape. In two recent meetings practically all of the important rules and regulations have been acted upon.

A new regulation provides that the Joint Operating Committee will refund \$25 to one authorized representative of each active jobber member of National Standard Parts Association and Motor & Equipment Wholesalers Association, for attendance as required during the first three days of the show. This regulation takes the place of previous arrangements under which refunds have been made in a lump sum to each of the two associations and in turn refunded by them to their respective members.

The only jobbers who will be admitted to the show during the first two days, Wednesday and Thursday, will be those who are members of either N.S.P.A. or M.E.W.A. Invited jobber guests



Lawrence P. Fisher (left), Cadillac vice-president, and **William A. Fisher** (right), Fisher Body vice-president, were skeet shooting recently at White Sulphur Springs, W. Va. With them was **Carl Bradsher** (center), well-known marksman and skeet instructor.

Acme photo

will be admitted on the last three days, Friday, Saturday, and Sunday, and on the final day, designated as Trade Day, all repairs will be privileged to attend.

This year's invited jobber guest list will be compiled, as in previous years, on the basis of lists of jobber customers supplied by manufacturer members of N.S.P.A. and the Motor & Equipment Manufacturers Association, the latter being a joint sponsor with N.S.P.A. and M.E.W.A.

Ruling on a matter which has been the source of considerable controversy in the past, the Joint Operating Com-

mittee has decided that members of the Automotive Booster Clubs who are not connected with a manufacturer member of either N.S.P.A. or M.E.W.A. at the time of the show, will be admitted only on Sunday, the final day. The decision is based upon the desire of manufacturer executives not to take time from jobber contacts during the show period to interview those who are desirous of securing connections with factory organizations.

Cost of space in the show has been set at 85 cents per sq. ft., with the average standard booth space running approximately 100 sq. ft.

Grand Prix to Bugatti

French Classic Won at Average Speed of 77.85 m.p.h.

Jean Pierre Wimille and Raymond Sommer, driving a straight eight, 198-cu. in. Bugatti, won the French Grand Prix at Montlhery, with an average of 77.85 miles for the distance of 621 miles. The four positions following were taken by six-cylinder Delahaye cars, with Bugatti sixth, Delahaye seventh and three Talbots following. The fastest lap was put up by René Dreyfus on a 244-cu. in. Talbot, at an average of 83.19 m.p.h.

This race was open to sports cars, without superchargers, using commercial brands of gasoline. While not being stock models, they bore a rather close resemblance to the cars sold to the public. The Bugattis and the Talbots, which were the fastest, developed 200 hp. and had a maximum speed of 130 m.p.h. Headlights, fenders, starters and touring equipment had to be carried, and two-passenger bodies were required, but with only one man aboard. Bugatti used a tank-type body, of uniform width throughout, and with completely enclosed rear wheels. After the race he broke the 100 kilometers international class record at 130.88 m.p.h.

Three eight-cylinder Hudson cars, specially prepared by a local dealer, started in the race. One of these took fire, another dropped out and the third finished at an average of 63.24 m.p.h.

Higher Priced Cars Lead in Gains

Lincoln, Packard, Buick and Cadillac Show Greatest Percentage Increase in Registrations

New Passenger Car Registrations

	May 1936	April 1936	May 1935	Five Months		Per Cent Change, 5 Mos. 1936 over 1935	Numerical Change, 5 Mos. 1936 over 1935	Per Cent of Total Five Months	
				1936	1935			1936	1935
Chevrolet	109,598	111,853	59,209	425,351	246,110	+ 73.0	179,241	28.67	20.84
Ford	85,209	86,302	93,467	335,250	405,195	- 17.2	-69,945	22.60	34.29
Plymouth	55,637	55,679	43,713	206,001	172,794	+ 19.2	33,207	13.88	14.62
Dodge	27,832	28,395	20,092	103,752	78,230	+ 32.6	25,522	6.99	6.62
Oldsmobile	23,956	24,682	17,930	87,186	64,019	+ 36.2	23,167	5.88	5.42
Pontiac	20,406	20,122	16,058	72,312	60,146	+ 20.1	12,166	4.87	5.09
Buick	17,950	18,956	7,082	65,826	27,318	+141.0	38,508	4.43	2.31
Terraplane	9,535	9,888	6,113	34,135	23,137	+ 47.8	10,998	2.30	1.96
Studebaker	7,657	7,775	4,479	28,277	17,110	+ 65.5	11,167	1.91	1.45
Chrysler	6,603	6,652	5,217	24,712	19,274	+ 28.0	5,438	1.67	1.63
Packard	6,302	6,690	3,964	23,185	8,907	+161.0	14,278	1.56	.75
De Soto	4,655	4,286	2,957	16,299	11,343	+ 43.9	4,956	1.10	.96
Hudson	2,611	2,809	2,486	10,328	9,455	+ 9.3	873	.70	.80
Nash	2,676	2,737	1,593	9,812	6,189	+ 58.8	3,623	.66	.52
La Fayette	2,495	2,306	1,684	8,493	6,478	+ 31.2	2,015	.57	.55
Graham	2,021	1,654	1,838	6,655	6,548	+ 1.5	107	.45	.55
Lincoln	1,367	1,400	211	5,283	771	+584.0	4,512	.36	.07
La Salle	1,394	1,448	1,593	5,164	4,245	+ 21.8	919	.35	.36
Cadillac	1,209	1,310	549	5,039	2,136	+136.5	2,903	.34	.18
Willys	1,309	994	981	4,590	3,811	+ 20.4	779	.31	.32
Reo	415	428	418	1,565	1,568	.....	-3	.11	.13
Hupmobile	176	211	877	1,223	3,611	- 66.1	-2,388	.08	.31
Auburn	284	278	561	1,122	2,516	- 55.4	-1,394	.08	.21
Cord	169	148	.....	406	.....	.....	406	.03	.....
Pierce-Arrow	76	100	75	352	298	+ 18.0	54	.02	.03
Miscellaneous	1,208	87	52	1,344	367	+266.0	977	.08	.03
Total	392,750	397,190	293,199	1,483,662	1,181,576	+ 25.6	302,086	100.00	100.00
Chrysler Corp.	94,727	95,012	71,979	350,764	281,641	+ 24.8	69,123	23.65	23.94
Ford and Lincoln	86,576	87,702	93,678	340,533	405,966	- 16.2	-65,433	22.95	34.36
General Motors	174,513	178,551	102,421	660,878	403,974	+ 63.5	256,904	44.54	34.19
All Others	36,934	36,105	25,121	131,487	89,995	+ 46.1	41,492	8.86	7.61

New Truck Registrations

	May 1936	April 1936	May 1935	Five Months		Per Cent Change, 5 Mos. 1936 over 1935	Numerical Change, 5 Mos. 1936 over 1935	Per Cent of Total Five Months	
				1936	1935			1936	1935
Chevrolet	21,443	23,323	16,284	94,379	66,620	+ 41.4	27,759	35.80	32.38
Ford	17,971	18,497	17,591	79,468	79,929	- 0.5	-461	30.14	38.83
Dodge	8,507	8,818	5,381	35,841	23,785	+ 50.4	12,056	13.59	11.56
International	6,704	7,308	4,807	28,515	19,721	+ 44.8	8,794	10.82	9.58
G. M. C.	3,045	2,733	883	8,515	4,031	+111.0	4,484	3.23	1.96
Diamond T	754	784	570	3,177	2,721	+ 16.9	456	1.21	1.32
White	541	566	267	2,167	1,281	+ 69.3	886	.82	.62
Reo	399	379	616	1,598	2,126	- 24.8	-528	.61	1.03
Plymouth	285	293	54	1,190	88	+1250.0	1,102	.45	.04
Studebaker	358	327	229	1,183	787	+ 50.5	396	.45	.38
Federal	275	271	193	1,144	767	+ 49.0	377	.43	.37
Mack	440	289	189	1,110	625	+ 77.8	485	.42	.30
Willys-Overland	235	205	224	903	592	+ 52.5	311	.34	.29
Terraplane	240	219	72	753	240	+214.0	513	.29	.12
Brockway	168	179	97	656	413	+ 59.0	243	.25	.20
Indiana	178	134	27	630	105	+500.0	525	.24	.06
Divee	141	164	47	455	106	+329.0	349	.17	.08
Autocar	109	121	78	450	325	+ 38.5	125	.17	.16
Stewart	116	112	60	448	258	+ 74.0	190	.17	.13
F. W. D.	35	31	15	170	89	+ 91.0	81	.06	.04
Twin-Coach	10	12	5	69	38	+ 81.5	31	.03	.02
Sterling	16	21	7	66	70	- 5.6	-4	.03	.03
Miscellaneous	213	175	272	748	1,103	- 32.0	-355	.28	.54
Total	62,183	64,961	47,968	263,635	205,820	+ 28.0	57,815	100.00	100.00

Tractors for CCC

Caterpillar, International and 4-Wheel Drive Get Big Orders

The Caterpillar Tractor Co. received the largest share of a \$2,798,691 equipment order recently placed by the U. S. Forest Service for the use of the Civilian Conservation Corps. Caterpillar will furnish 169 tractors and 145 grader units with a combined value of \$1,262,691. The International Harvester Co. will supply an additional 127 tractor units valued at \$255,180 while the Cleveland Tractor Co. has received orders for 79 units valued at \$88,956. Five additional graders will be supplied by the Allis-Chalmers Co. at a cost of \$11,265.

Truck orders have been placed with the Four-Wheel Drive Auto Co. for 86 units valued at \$425,000, with Fargo Motor Co. (Dodge), for 316 units valued at \$306,194 and with General Motors Truck Corp. for 10 units valued at \$25,632.

Bertrum Gray

Bertrum Gray, president of the Sturdy Mfg. Co., Sturgis, Mich., and for many years identified with the automotive equipment manufacturing industry, died recently at the home of a brother in Milwaukee. He was 67 years of age and a native of Canada. He organized the Sturdy firm in 1916.

Motor Union Merger Completed

*Frankenstein Heads Organization Campaign in Detroit;
CIO to Use Steel Industry as Spearhead of Drive*

Amalgamation of the Automotive Industrial Workers Association with the United Automobile Workers International Union was formally completed last week. All of the 26 locals of the former organization have received their charters. Richard T. Frankenstein, was placed in charge of organization work for Detroit by Homer Martin, president of the International. The first of a series of bi-weekly broadcasts over station WMBC went on the air Friday last week, inaugurating the union's membership drive. Fifteen minute speaking programs are being broadcast starting 10:15 and 7:15 on Friday and Saturday evenings, respectively, for 26 weeks. Negotiations also are under way for a contract with one of the major radio stations in Detroit.

Among the speakers scheduled to appear on the programs are Leo Krzyscki, vice-president of the Amalgamated Clothing Workers and a representative of the Committee for Industrial Organization; Adolph Germer of the United Mine Workers and the C.I.O. and John Lewis. Germer addressed a recent meeting of the Trim Local of Dodge Bros.

Arrangements are being made to hold a mass meeting in the near future of workers of East Side Detroit and another for the West Side, to be followed by a joint mass meeting for the entire city at which John Lewis will be invited to speak.

C.I.O. Begins Vertical Union Drive

The drives begun by the Committee on Industrial Organization, headed by John L. Lewis, to unionize mass industries vertically have created a great deal of concern both in Washington and in the industrial world. The general view of authorities at the capital, though not openly expressed, is that there will be no wave of strikes, at least during the Presidential campaign. If there are strikes, it is clear that the C.I.O. will attempt to lay the blame

on the iron and steel industry, which is the spearhead of the drive.

The C.I.O. by means of the radio, publicity statements and mass meeting plainly are seeking to sell the public on the idea that the industry has prepared for a strike and even is inviting it before the unionization drive has penetrated deeply.

In the automotive industry, tactics are generally localized. While the whole campaign is called "educational" it appears that this is the strategy adopted with particular reference to the automotive industry. Perhaps the outstanding reason is that the layoff season is at hand in the automotive industry and that advantage will be taken to make use of it to spread unionization propaganda. The hope apparently is to build up a strong membership and then to await resumption of increased activities to make demands. The attitude of the automotive industry is to receive and negotiate with any organization representing a substantial group of workers but with a strict bar against the closed shop.

Campaigns also are being started in the rubber and textile industries.

Strikes Fail to Follow Economic Trends

Economic factors afford no explanation of the increase in strikes since 1932, according to the National Industrial Conference Board.

The Board's study points out that, since strikes are supposedly protests against working conditions or against living conditions made necessary by inadequate earnings, there should be considerable correspondence between industrial disputes and those economic factors which bear directly upon the industrial situation. From 1927 through 1932, the average number of persons on strike follows fairly closely the trend of economic factors.

Beginning in 1932, however, the number on strike shows complete independence of economic factors. While industrial production, weekly earnings, and the cost of living advanced at a moderate rate, and union membership somewhat more rapidly, the number on strike increased three and four-fold during 1933, 1934, and 1935 in comparison with preceding years.

172,877 Cars Built in Canada

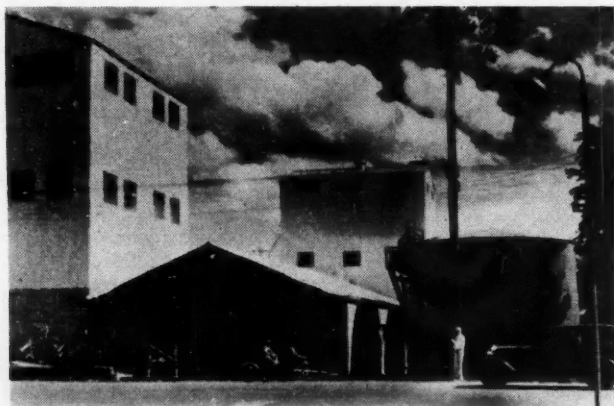
Last Year's Production Valued at More Than Hundred Millions, a Gain of 40% Over Previous Year

Final figures for the automobile manufacturing industry in Canada in 1935 place production of Canada's 14 companies at \$106,600,000, or 40 per cent greater than 1934. This is the highest value reported since 1929. This figure represents factory selling value or wholesale prices of all motor cars and parts made for sale in Canada or for export by manufacturing and as-

sembling plants in the Dominion, together with the amount received for custom and repair work. Automobile production alone totaled 172,877 units, with an aggregate wholesale value of \$99,000,000. Of this total, 60 per cent (by number) were made for sale in Canada, and the remainder for export.

The improvement in domestic demand was 43 per cent, and the gain in units made for export, 55 per cent. Of the total production, passenger cars accounted for \$79,200,000. Passenger car units totaled 135,562, of which 63 per cent were made for domestic sale and 37 per cent for export.

Production was carried on by 14 companies with 20 separate factories in operation. Fourteen of these establishments were in Ontario, two in Quebec, three in British Columbia and one in Manitoba. Estimated yearly capacity was 228,274 passenger cars and 39,151 trucks. On this basis it is calculated the industry operated at about 65 per cent of capacity during 1935, compared with 44 per cent in 1934 and 17 per cent in 1933. Capital employed totaled \$40,700,000 compared



First power alcohol plant at Atchison, Kans., nears completion. Built under the direction of the Chemical Foundation, Inc., alcohol will be made from farm products and blended to the extent of 10% with gasoline

Acme photo

with \$34,500,000 in 1934. This increase was due to operating capital which was higher by \$6,100,000.

Average number of employees in 1935 was higher than in any other year except 1928 and 1929. The number on the payroll was over 13,000, compared with 9674 in 1934. Salary workers numbered 1930, receiving over \$4,000,000. Wage earners averaged 11,165 and their earnings aggregated \$14,700,000. Materials for manufacturing or assembling cost \$75,600,000.

Apparent consumption of automobiles in Canada is estimated at 112,367, or an increase of 48 per cent, against which it is estimated 69,951 cars were withdrawn from use, compared with a corresponding figure in 1934 of only 29,721 cars. The low figure for 1934 as compared with other years is attributed in part to the return to the road of many private cars and to the relicensing of used cars not registered in the previous year. Actual sales of new motor vehicles in Canada during the year numbered 100,961 valued at retail at \$101,000,000. Of this total 83,242 were passenger cars, and 17,719 were trucks and buses.

Los Angeles Raceway Planned

Sanction for a 500-mile International Sweepstakes to open a projected \$1,000,000 Los Angeles Raceway has been granted by the Contest Board of

the American Automobile Association. The opening event is planned for Nov. 29 and will possibly draw some of the foreign racing teams which plan to compete in the opening of Roosevelt Raceways, Long Island, in October.

L. C. Chase Shows in Detroit

L. C. Chase and Co., Inc., has opened a showroom in Detroit to exhibit automotive fabrics produced by Goodall Sanford Industries, for which they are the sales division.

Used Car Stocks No Danger

Reports of Dealers in Two Cities Show Ratio of Stocks to Sales Lower Than Two Years Ago

Used car stocks in the hands of dealers have been greater this year than ever before, but that fact does not justify fears for the dealers' solvency, according to Milan V. Ayres, who discusses the subject in the July issue of *Time-Sales Financing*, published by the National Association of Sales Finance Companies. There is no threat to the dealers' solvency, he continues, because car sales have also been greater than ever before. It is not the size of stocks alone that is important but the relationship between the number of cars in stock and the number being sold.

Monthly used car stocks in two cities, St. Louis and San Francisco, have been charted from the beginning of 1932 through May, 1936. The figures show that in both cities the stocks in May, 1936, were more than two and one-half times greater than in May, 1933. In

the same chart other curves have been plotted to show what percentage the cars in stock at the end of each month were of the number sold during the month. The sales and stocks figures were reported by the same groups of dealers so that changes in the number of dealers reporting do not affect appreciably the ratios.

A marked seasonal effect is shown in the ratios between used cars in stock and sales. These are high at the year ends and low about the middle of each year. The curves are remarkably alike in spite of the greatly different climates of the two cities. Although the number of cars reported in stock by the St. Louis dealers in February, 1936, was more than twice as great as the number for December, 1934, the ratio between stocks and sales for these two months was identical and was lower than for December, 1932. For San Francisco, the ratio for December, 1935, was lower than for the same month in 1934 or 1932.

It seems evident that an index based exclusively on the number of cars in stock would have little value and might be misleading, but a ratio index, showing the relation of stocks to sales as compared with the same months in previous years, would be really informative.

The N. A. S. F. C. chart is reproduced herewith.

GM Breaks All Records for June

World Sales for Six Months Top 1935 by 32 Per Cent; U. S. Dealer Stocks Drop Still More in June

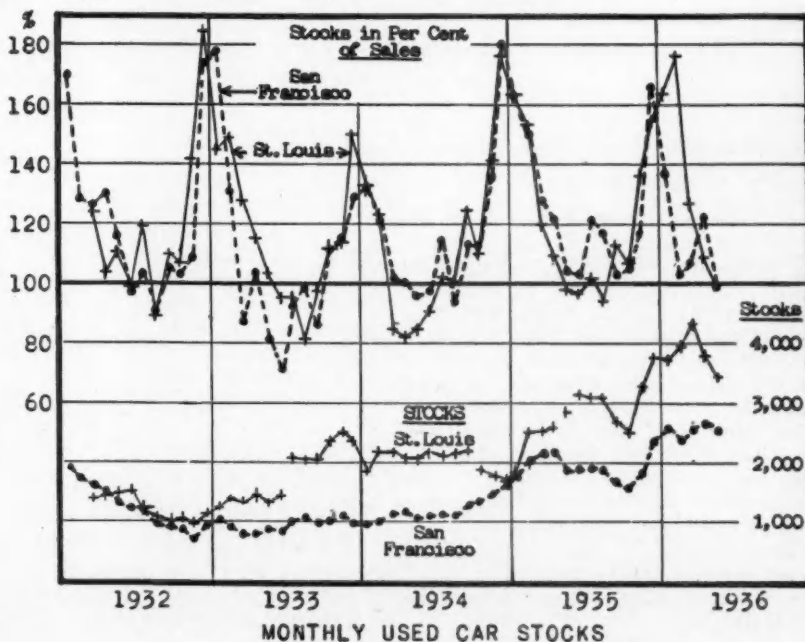
	June, 1936	May, 1936	June, 1935	Six Months 1936	Six Months 1935
Sales to world dealers.....	217,931	222,603	181,188	1,170,168	888,560
Sales to U. S. dealers.....	186,146	187,119	150,863	978,274	710,224
Sales to U. S. consumers....	189,756	194,628	137,782	964,451	648,835
Change in U. S. dealer stocks	-3,610	-7,509	+13,081	+13,823	61,389
Sales to foreign dealers.....	31,785	35,484	30,325	191,894	178,336

General Motors world sales to dealers during June, totaling 217,931 units, were well in advance of the 181,188 units sold during the same month a year ago, and showed only a small drop compared with May when 222,603 units were sold.

Dealer stocks in the United States were reduced by an additional 3610 units which compares with an increase in stock during June last year of 13,081. Since Jan. 1 dealer stocks have increased but 13,823 units, contrasted to an increase during the same period last year of 61,389 units.

For the first six months of the year, world sales totaled 1,170,168 units compared with 888,560, sales to U. S. consumers totaled 978,274 compared with 710,224, and sales to foreign dealers increased from 178,336 in 1935 to 191,894 in 1936.

The accompanying table shows the General Motors sales picture, domestic and foreign for June and the first six months.



Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

The level of general business activity was well maintained last week, and further gains were reported in some directions. Several important industries continue to show contra-seasonal increases in output. The outlook is somewhat clouded, however, by labor unrest in certain industries and by the serious drought in some farming sections.

Freight Loadings Gain

The movement of railway freight continued to increase during the week ended June 27. Loadings in that period totaled 713,639 cars, showing a gain of 22,923 cars, or 3.3 per cent over the figure for the preceding week, a gain of 96,776 cars, or 15.7 per cent above that for the corresponding period of 1935, and an increase of 67,363 cars, or 10.4 per cent above that two years ago.

Power Makes New High

Production of electricity by the electric light and power industry reached another new high record during the week ended June 27, exceeding the total of 2,000,000,000 kilowatt-hours for the third time in the history of the industry. The current total shows a gain of 14.5 per cent above that a year ago, as against 13.0 per cent a week earlier, 14.2 per cent two weeks earlier, and 12.8 per cent three weeks earlier.

Crude Production Steady

Average daily production of crude petroleum for the week ended June

27 amounted to 2,969,150 bbl., showing a gain of 5750 bbl. above the output of the preceding week and exceeding the figure of 2,838,300 bbl. calculated to be the total of the restrictions imposed by the oil-producing States for June. Output a year earlier averaged 2,689,850 bbl.

Lumber Output at 69%

The lumber industry during the week ended June 20 stood at 69 per cent of the 1929 weekly average of production and 65 per cent of 1929 shipments, according to the National Lumber Manufacturers Association. New business was 5 per cent, and shipments were 9 per cent below output.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended July 4 stands at 83.1, as against 82.6 a week before, 82.5 two weeks before, 82.3 three weeks before, and 81.2 four weeks before.

Federal Reserve Statement

The principal change in the banking situation during the week ended July 1 was a decline of \$345,000,000 in Treasury cash and deposits with Federal Reserve banks, with an increase of \$281,000,000 in member bank reserve balances. Money in circulation increased \$77,000,000 and the monetary gold stock \$12,000,000, while the amount of Reserve bank credit outstanding rose \$1,000,000.

a Henry Ford enterprise, has transferred to the Eastern Coal Corp., a new concern, "all its tangible, visible property in Pike County, Ky., other than unimproved real estate."

New Acts Under Study

Rulings Being Formulated on Patman and Healey Measures

Both the Patman-Robinson anti-price discrimination and the Healey Government contracts acts are being given interpretative study by Government attorneys. The Patman-Robinson law is being analyzed by the general counsel for the Federal Trade Commission, its administrative body, and the Healey act is being studied by the solicitor of the Department of Labor, its administrative body.

Both laws, and particularly the Patman-Robinson act, have been the object of various interpretations by trade organizations, and it is the purpose of the Federal Trade Commission and the Department of Labor to clarify them as much as possible. No rigid rulings are expected to be made as to either law, however. In the case of the Patman-Robinson act the F.T.C. will not issue rules and regulations but will use the analysis of its chief counsel in the nature of a memorandum to set up the framework of its administration. Particular cases will be subject to disposal according to their individual merits. It is likely that some form of provisional rules and regulations will be offered to govern administration of the Healey act. The former act is now in effect. The Healey act goes into effect 90 days after its signature by the President. It was signed June 30. The effective date, therefore, would be Sept. 28.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Chevrolet to Hold Soap Box Derby at Akron August 16

Soap box derby champions from 115 American cities will compete in the All-American Soap Box Derby in Akron, Ohio, Aug. 16, while champions from several foreign cities will augment their number for the running of the first International Soap Box Derby on the same day. Sponsored by the Chevrolet Motor Co. in cooperation with more than 115 newspapers, the soap box derby has become one of the greatest juvenile and amateur sporting events in the world. Last year more than 200,000 spectators lined the steep Tallmadge Hill in Akron to see the juvenile racers guide their home-made, powered-by-gravity speeders across the finish line.

Prizes for the winners in the various events in the American and International derbies, will range from Chevrolet sedans down to watches and medals. All contestants will be provided with special Chevrolet metal racing helmets. Chevrolet officials will supervise the main events in Akron and entertain the winners at a banquet where the prizes will be awarded. In all probability radio networks will carry running descriptions of the Akron races.

Ford Coal Mining Company Sells Kentucky Property

For a paid consideration, the amount of which was not revealed, and the promise to pay an additional \$1,140,000 within 15 years, the Fordson Coal Co.,

Haynes & Apperson, Kokomo, Ind., write that they are building a new carriage which they expect will be considerably in advance of their previous models.

With the exception of the cylinders, which are of steel tubing, all parts of the motor are made of aluminum. Their experience, they state, has demonstrated the superiority of aluminum over cast iron in carriage motors, a truth which they claim to have been the first to discover.

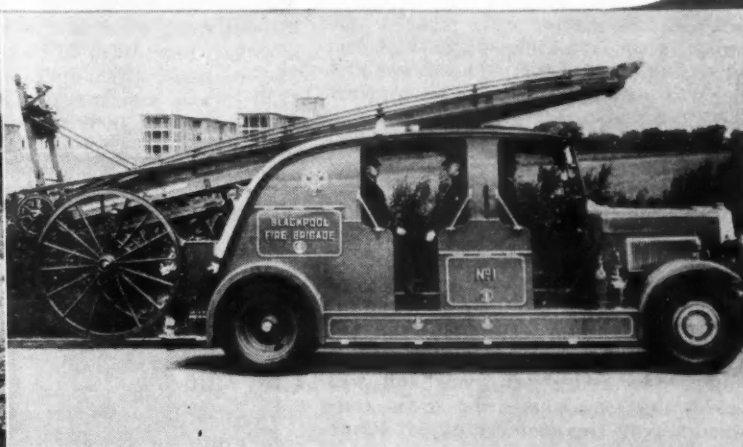
Their motor traps entered at Chicago had a maximum speed of 12 m.p.h. on ordinary country roads. They expect that the new vehicle will make an average of 14 m.p.h. on good, level roads.—From *The Horseless Age*, July, 1896.

The WORLD on WHEELS



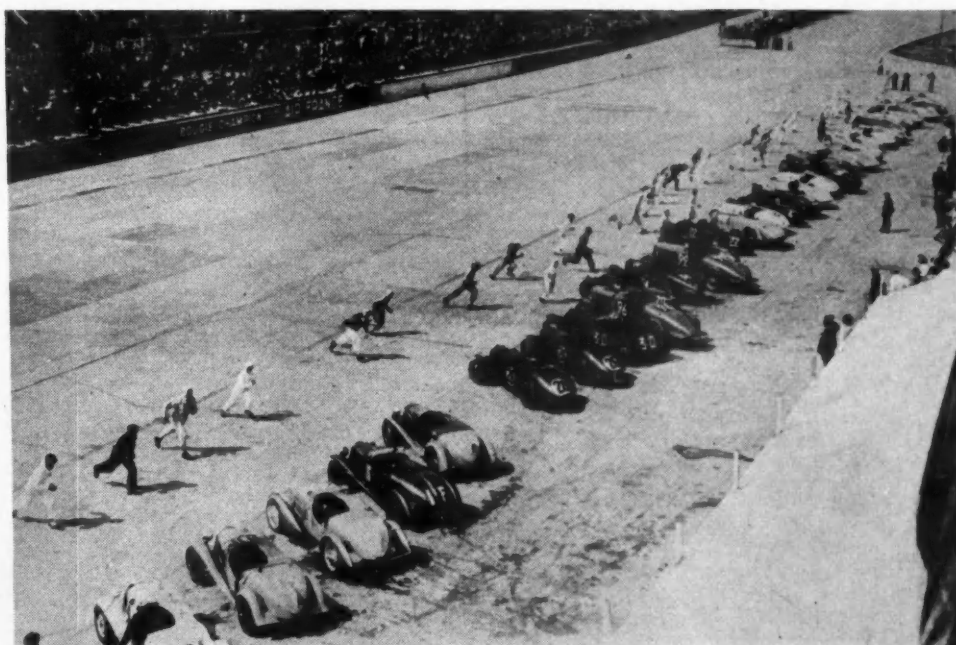
(Left), Rewarded for his high record in turning out axles in the Stalin motor works in Moscow by the gift of a car, V. A. Babkov, pressman, takes his family for a picnic in his new car

(Below), Blackpool, England, takes delivery of a streamlined fire engine specially designed by its fire chief. Maximum speed of the engine is 60 m.p.h. and it pumps 1000 gal. per minute. The crew of 11 rides in the central enclosed compartment



(Above), The Spanish army tries out a fast armored car built by the German Krupp plant. A speed of 60 m.p.h. is claimed for the vehicle and an ability to climb slopes of 45 degrees

(Right), Foot-work counted as well as driving ability at the French Grand Prix held recently at Montlhéry. The drivers toed the line, then raced for their cars when the signal was given for the race to begin



International-Keystone and Acme Photos.

Ford Power Addition

*\$420,000 Being Spent at Rouge;
Other Companies Building*

In order to accommodate the record electric consumption peak at the Ford Rouge plant, work has been started on a powerplant addition which will cost approximately \$420,000. The new addition is entirely supplemental to the major modernization program in effect at the plant for the past 18 months. Power requirements have risen from 130,000 kilowatts in 1935 to present demands of 155,000 kilowatts.

Ryerson & Haynes, Inc., Jackson, Michigan, manufacturers of steel tire covers, automotive jacks, and other automobile parts and accessories, have opened a branch plant in New Brunswick, N. J., for the purpose of supplying automobile manufacturers who have plants or branches in the East. Additional space has recently been acquired in Jackson also, through the taking over of the plant of the Watts-Morehouse Co. which adjoins the Ryerson & Haynes factory.

The Packard Electric Corp., manufacturers of automotive cable, have started construction of a modern one-story factory building which will cost in excess of \$200,000. The new building will provide an increase of approximately 50 per cent in actual manufacturing floor space and will make possible the addition of new equipment and a re-arrangement of existing facilities.

The American Forging and Socket Company has let contracts for the construction of a new one-story addition to the plant, which when completed and equipped, will represent an investment of approximately \$150,000. The building will provide about 40,000 square feet additional space and will be of steel, masonry, and glass construction of the monitor type. Plans are being prepared also for a new power plant, which will be constructed in the near future. The company's products consist of automobile seat frames, seat adjusters, and special

British Overseas Motor Trade Up

Heavy Parts Buying Puts Imports Ahead in Spite of Passenger Car Drop; Used Cars Exports Gain Most

	MAY				FIVE MONTHS			
	1936		1935		1936		1935	
	No.	Value	No.	Value	No.	Value	No.	Value
IMPORTS								
Cars.....	859	£163,633	2,202	£331,192	5,877	£1,055,149	8,440	£1,267,475
Commercial Vehicles.....	53	6,665	32	6,156	219	25,357	107	22,576
Chassis.....	251	31,010	196	24,551	1,404	162,291	1,509	167,488
Parts.....		132,610		120,113		817,795		514,968
Total.....		£333,918		£482,012		£2,063,592		£1,972,507
EXPORTS								
Passenger Cars (New).....	4,796	515,589	3,559	432,420	20,196	2,370,721	19,857	2,435,103
Passenger Cars (Used).....	251	26,181	179	18,191	2,499	208,146	1,040	114,140
Commercial Vehicles.....	223	68,547	192	41,745	1,149	332,982	909	257,608
Chassis (Commercial).....	1,112	152,596	892	151,407	5,042	737,589	4,637	714,592
Chassis (Other).....	861	72,584	1,059	98,849	4,645	373,754	4,136	387,725
Engines.....	634	13,780	1,025	22,558	3,198	72,499	3,878	93,775
Spark Plugs.....	100,113	7,109	117,427	7,501	504,568	32,947	593,105	37,448
Parts.....		204,722		226,756		930,945		959,974
Total.....		£1,061,108		£999,427		£5,059,583		£5,000,365

hinges of various types. Several new products will shortly be announced.

Wadhams Oil Co., Milwaukee, affiliated with Socony-Vacuum Corp., has started work on a \$200,000 bulk plant at Green Bay, Wis., to be ready Oct. 1. The company, which operates more than 1700 service stations in Wisconsin and upper Michigan, will then be in a position to receive gasoline from its Indiana refineries by an all-water route. Six 60,000-gal. tanks comprise the initial installation.

John E. Gilson Co., Port Washington, Wis., specializing in the manufacture of intricate gray iron castings, is building a \$25,000 addition.

Cleveland Exhibit

(Continued from page 36)

presidents and famous men. Studebaker also features a car tilted at an angle of 45 degrees, enabling visitors to see the undercarriage assembly.

White has a large floor space with a

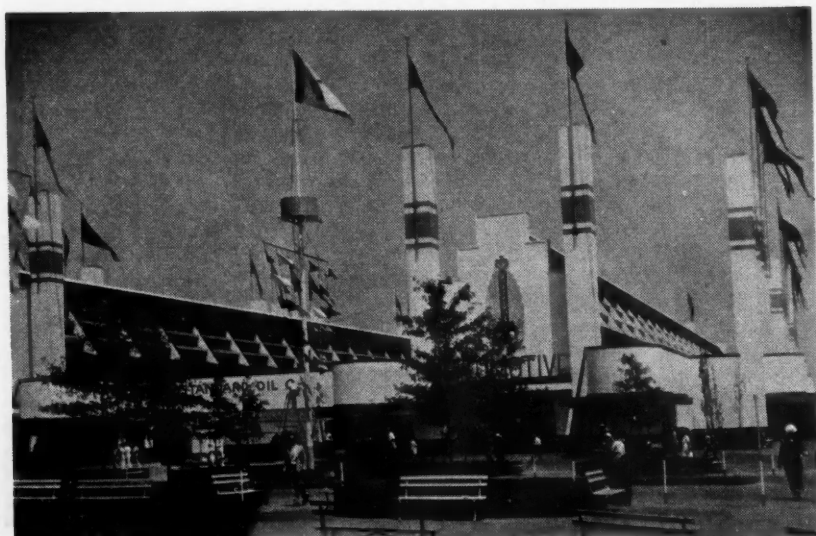
complete line of truck and bus models, including the latest in streamlining in this field. A feature is a photographic history of the company's development and a series of wall plaques portraying the operation of its plant.

Briggs Body has a large display of body models all ready to be fitted on the chassis.

Thompson Products features the Thompson Trophy, awarded annually to the speed king of the National Air Races. In glass cases at each side of the trophy itself are pictures of the famous flyers who have won it with exact models of their winning 'planes.

Among other exhibits in the automotive building are those off: Cleveland Worm & Gear Co., Cleveland Yacht & Supply Co., Farval Corp., Greyhound Management Corp., M. R. Henry, Leece-Neville Co., Mullins Mfg. Co., Pennz-Oil, Kitchen Novelty Co., S. M. Shackelford, Socony-Vacuum Oil Co., Standard Oil Co., Stearn Advertising Co., U. S. Truck Lines and Willard Storage Battery Co.

Leading motor manufacturers are represented in this huge automotive building at the Great Lakes Exposition. Equipment from Harvey S. Firestone's own estate is displayed at the Firestone farm exhibit.





Wallace Zwiener

Wallace Zwiener Dies

*Was President of Hupp Since May;
Entered Industry in 1917*

Wallace Zwiener, president of the Hupp Motor Car Corp. since May 13, died in the Grace Hospital, Detroit, on July 7. Mr. Zwiener came to Hupp as treasurer in 1934 and has been looked upon as a principal figure in the company's activities since that time.

Previous to his career at Hupp, Mr. Zwiener had spent many years in the automotive industry. From 1917 to 1921 he was assistant general controller of Chevrolet. In 1921 he went to Durant Motors as chief controller of that company and in 1930 he took the position of Controller of Continental Motors. He remained in that capacity until he came to Hupp.

Mr. Zwiener, who was active in Detroit social activities, is survived by his wife, his mother, and two brothers.

June Estimates Shattered

(Continued from page 35)

sales gain are orders for 81 stainless steel railway cars, which compares with a total of 14 cars produced during 1935.

Foreign shipments of Buick cars exclusive of Canada for the first six months totaled 5609 units compared with 3326 during the first half of 1935.

Cadillac-LaSalle domestic retail deliveries showed an increase of 41 per cent during the first six months. According to company officials all lines shared in the advance, and the largest percentage gain was in the highest priced group.

A counter-seasonal upturn in sales of Ford V-8 trucks and commercial cars resulted in sales of 7688 units in the 10-day period ending June 30, top-

ping last years sales for the period by 981 units.

Graham-Paige Motors Corp. reports a 40 per cent gain in second quarter sales over the same period last year, showing a higher total than any second quarter in the past five years.

Oldsmobile sales for June, amounting to 21,900 units established a new all time June record for the company, and registered a gain of 34 per cent over the same month a year ago.

June retail sales of 20,614 Pontiacs compared with 15,422 units sold in the same month last year, and represented the highest June sales in the company's history with the exception of 1928. Sales for the first six months totaled 95,502 units compared with 82,405 a year ago.

Studebaker reports June sales 82 per cent a head of 1935 while company sales for the first six months were 59 per cent ahead of last year. Retail deliveries for June totaled 7729 units, exceeding all June sales for the company except 1928.

Hupp To Be at N. Y. Show With 1937 Production Cars

Hupp Motor Car Corp. has applied for space at the New York Automobile Show next November. The management hopes to have new capital and to be in production on 1937 models before the show. The corporation's engineering department is going ahead with developments work on 1937 cars which will not be greatly changed from the 1926 line. Some new body dies will be



B. E. HUTCHINSON, vice-president and chairman of the finance committee of the Chrysler Corp., has been elected to serve a five-year term on the governing board of the Massachusetts Institute of Technology. Mr. Hutchinson graduated from M.I.T. in the class of 1909.

SCHUYLER HAZARD, JR., has been appointed sales engineer of the Yale and Towne Mfg. Co., effective July 29.

FRED J. LAMBORN has been promoted to the office of vice-president in charge of manufacturing of the Dodge Division of Chrysler Corp. Mr. Lamborn has just completed a quarter century with Dodge, having begun in 1911, three years before the founders of the company began making automobiles under their own name. Mr. Lamborn, until his latest promotion, was operations manager for all Dodge properties.

HERMAN THOEN, formerly experimental engineer with the International Harvester Co. and later sales engineer with the Perfex Radiator Co., has been appointed sales engineer in the automotive division of the Modine Manufacturing Co., Racine, Wis.

required but the changes will not be expensive and the new cars will be designed so as to utilize materials that have been purchased for the current models. It is quite improbable that the company will be able to resume production on any of the 1936 cars.

Esso Marketing 150 - V. I. Oils

To simplify the problems of engineers concerned with the operation of equipment subject to a wide range of atmospheric temperatures, Standard Oil Company of New Jersey and its affiliates, known as the Esso Marketers, have introduced special oils, branded as Univis, with a viscosity index of 150, the highest yet offered.

Univis oils are 100 per cent petroleum products, no chemicals being added. Their high viscosity index makes them especially valuable for such mechanisms as hydraulic control apparatus, platform scale dash pots, hydraulic variable speed equipment, and specialized equipment and instruments subjected to extremes in temperature variation.

Goodyear Leases Hupp Building

The Goodwear Tire and Rubber Co., Akron, has leased the engineering building of the Hupp Motor Car Co., Detroit. Whether it is planned to use the building for manufacturing or warehousing has not been stated. Goodyear is reported also to be negotiating for a plant at Jackson, Mich.

JOHN J. HILT, for 16 years with F. M. Young in the radiator industry and with the Young Radiator Co. since its inception, has been appointed vice-president in charge of sales, contract division, of the Young company. Mr. Hilt in his new position continues in the work he has been in charge of for the past eight years.

HERBERT L. SHARLOCK, for many years associated with Vincent Bendix and Bendix enterprises, has been elected vice-president, director of publicity of the Bendix Products Corp. Mr. Sharlock is president of the South Bend Country Club, former president of the South Bend Chamber of Commerce, and commodore of the South Bend Yacht Club.

M. E. NICKLIN has been named export manager of the Waukesha Motor Co. to fill a position newly created to handle the growing overseas business of the company.

A. FRANCIS ARCIER, chief engineer of the Waco Aircraft Co., has been elected a fellow of the Royal Aeronautical Society of England, one of the highest honors in the world of aviation.

JULIAN C. GONZALEZ has been elected secretary of the Ethyl Gasoline Corp. to succeed the late Arthur E. Mitnacht. Mr. Gonzalez has served as field representative with Ethyl and is now with the manufacturing division.

CHARLES E. NELSON, JR., has been appointed coordinator of purchases, planning and production activities of the Waukesha Motor Co., Waukesha, Wis., to fill the vacancy caused by the death of Albert S. Cronk.

Automotive Metal Markets

Automotive Consumers Press Steel Mills for Shipments Needed to Wind Up Current Model Production

By William Crawford Hirsch

When third-quarter steel prices were marked up \$2 a ton, it was thought that some automotive consumers would be displeased by having to take in during the first days of July what steel was coming to them at old prices. What really has happened in most cases was that a good many buyers pressed steel mills to expedite these shipments, much of the steel being needed in current assemblies.

The tonnage of steel being absorbed in the tail-end production of 1936 models came as a surprise to steel producers. Under these circumstances, booking of a certain amount of business at third-quarter prices, to round out supplies on hand or previously arranged for, came as a perfectly natural development. In some quarters this was taken as proof that the higher prices have met with full acquiescence on the part of buyers.

Recent developments have for the time being eliminated the subject of price as an immediate market problem. It is not likely to be revived until tonnage purchases for new model output come up for consideration.

Reports of the building up of steel inventories in view of the labor situation in the steel industry continue. Steel warehouse men, in the very nature of their business, aim at being well stocked when the possibility of an interruption in mill operations looms, no matter how remote such a contingency may be generally looked upon. Reserves of semi-finished steel for rolling into flat steels in non-integrated mills as well as in those not depending on others for their supply of raw steel are thought to be adequate and perhaps are being added to. As for automotive consumers altering their normal buying policies, there is not the slightest indication.

This week's rate of employed ingot capacity, reported by the American Iron and Steel Institute as 67.2 per cent, is the lowest in three months, but compares with 35.3 per cent in the corresponding period of last year. It is also noteworthy in this connection that from July 8 to Sept. 30 of last year there was a steady climb in the rate of employed ingot capacity.

Pig Iron—Demand from automotive foundries is spotty and on the whole rather light. Prices are unchanged.

Aluminum—Quiet and unchanged.

Copper—Consumption is proceeding at a rate which producers consider quite satisfactory. Nothing of moment, however, appears to be in sight to change the 9½ cent price, which producers have quoted for the last three months.

Tin—Announcement at the New York office of the International Tin Committee that Bolivia, second largest among the world's tin producing countries, had consented to a production quota of 75 per cent, permitting other countries to produce at the rate of 90 per cent, was interpreted by traders as a bullish factor, sending the

price of spot Straits from 40½ cents at the preceding week's close to 41½ cents on Monday. An Amsterdam report has it that a producers' pool has been formed, to operate independently of the International Tin Committee. Details are lacking so far.

Lead—Somewhat more active and steady.
Zinc—Dull and unchanged.

Ford Makes Change in Interior Trim of Cars

Improvements in the interior treatment of Ford V-8 de luxe and standard body types are now in production.

In addition to the interior changes, two new body finish colors are made available—armory green and light-fast maroon—which are standard in de luxe types. New accessories have been added in the de luxe types. These include a new sport-type steering wheel with spring steel flexible spokes, a pull-wind 30-hour clock recessed in the rear vision mirror and a glove compartment lock.

Improvements in the standard interiors include a new mahogany-grain finish on instrument panel and window moldings, new ash tray, new chrome-finish fittings, carpets, the new up-

holstery design, redesigned seat and back cushions and a choice of broadcloth or mohair upholstery.

Kenosha to Celebrate Nash Motor's 20th Anniversary

Kenosha, Wis., is preparing for a city-wide jubilee on July 29 in celebration of the twentieth anniversary of the establishment of the Nash Motors Co. It was on July 29, 1916, that Charles W. Nash took over the plant of the Thomas B. Jeffery Co. and began production of Nash cars. The Jeffery company, a pioneer in manufacturing passenger cars as the outgrowth of the bicycle business, brought out the former Rambler passenger car in 1899, later giving the Jeffery name to its product. Plans for the jubilee are being made by the Kenosha Chamber of Commerce. In the afternoon there will be a parade including all Nash models from 1916 to the present, and in the evening a testimonial banquet will be tendered Mr. Nash.

Correction

The 1935 first quarter earnings of the Consolidated Aircraft Corp. were erroneously reported in the June 20 issue of *Automotive Industries*. First quarter earnings totaled \$3,730 in 1936, and \$32,225 in 1935.

Calendar of Coming Events

SHOWS

- International Automobile Section, 7th Levant Fair, Bari, ItalySept. 6-21
- Automobile Salon, Oriental Fair, Lwow, PolandSept. 5-15
- 30th Automobile Salon, Paris, France, Oct. 1-11
- Olympia Motor Show, London, England, Oct. 15-24
- Czechoslovakia, 26th International Automobile Exposition, Prague.....Oct. 16-25
- 9th International Automobile Salon, Milan, ItalyNovember
- National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7
- National Automobile Show, Grand Central Palace, New YorkNov. 11-18
- International Aviation Show, Paris, FranceNov. 13-29
- Boston Automobile Show.....Nov. 14-21
- Columbus Automobile Show.....Nov. 14-20
- Chicago Automobile Show.....Nov. 14-21
- Detroit Automobile Show.....Nov. 14-21
- Washington, D. C., Automobile Show, Nov. 14-21
- Cincinnati Automobile Show.....Nov. 15-21
- St. Louis Automobile Show.....Nov. 15-22
- Brooklyn Automobile Show.....Nov. 21-28*
- Cleveland Automobile Show.....Nov. 21-28
- Kansas City Automobile Show.....Nov. 21-29*
- Milwaukee Automobile Show.....Nov. 22-29
- Baltimore Automobile Show.....Nov. 26-Dec. 5
- 28th Automobile Salon, Brussels, BelgiumNov. 28-Dec. 9
- Peoria Automobile Show.....Nov. 30-Dec. 5*

* Tentative dates.

- Philadelphia Automobile Show, Nov. 30-Dec. 5*
- Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York CityNov. 30-Dec. 5
- Automotive Service Industries Joint Show, ChicagoDec. 9-13

CONVENTIONS AND MEETINGS

- Mid-Summer Convention of Automotive Trade Association Managers, Montreal, Que.July 28-30
- National Association Power Engineers, Annual Meeting, Chicago, Aug. 31-Sept. 4
- American Chemical Society, Semi-annual Meeting, Pittsburgh, Pa., Sept. 7-12
- World Power (Fuel) Conference, Washington, D. C.Sept. 7-12
- American Transit Association, Convention, White Sulphur Springs, W. Va.Sept. 21-24
- First Aircraft Production Meeting of the S. A. E., Los Angeles.....Oct. 14-16
- Annual Meeting of the National Association of Motor Bus Operators, Detroit, Mich.Oct. 15-16
- American Society for Metals, 18th Nat'l Congress, Cleveland, O.Oct. 19-23
- 16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23
- American Gas Association, Annual Meeting, Atlantic City.....Oct. 26-31
- American Petroleum Institute, Annual Meeting, Chicago.....Nov. 9-12
- National Foreign Trade Convention, ChicagoNov. 18-20
- Natl. Industrial Traffic League, Annual Meeting, New York City.....Nov. 19-20

Just Among Ourselves

with the business of motor haulage is entitled to an opinion, and should obtain a copy of the Proposed Regulations without delay.

* * *

Used Car Stocks "Not Alarming"

INCREASED stocks of used cars in the hands of dealers do not justify in themselves fear for the solvency of dealers, according to Milan V. Ayres, analyst of the National Association of Sales Finance Companies. In an article in the current bulletin of the association Mr. Ayres points out that used-car sales have been greater this year than ever before, and that the important thing in connection with used cars is not the size of stocks but the relation between the size of the stocks and the number of used cars being sold. Digest of the data used by Mr. Ayres to support his contention appears in the news section of this issue.

* * *

New Data Books Pass in Review

THE week has been prolific in data books. First to arrive was the "Official Automobile Guide," with information on wholesale and retail values of used cars and trucks, besides a lot of material on state laws affecting motor vehicles, etc. "Bus Facts," published by the National Association of Motor Bus Operators, was close on its heels, with a note that "Facts and Figures of the Automobile Industry" can be expected within a couple of weeks from the Automobile Manufacturers Association.

Last, but of potentially much greater importance, we have for

mention "Proposed Safety Regulations of the Interstate Commerce Commission Applicable to Motor Carriers Subject to the Motor Carrier Act, 1935." As the title suggests, the Regulations have not official status to date. They have not yet been offered to the full Commission for approval and are simply being circulated for the information and criticism of carriers and others interested.

In a letter accompanying the Proposed Regulations, John L. Rogers, director of the Bureau of Motor Carriers of the I.C.C. asks particularly for opinions on the "propriety" of preparing similar regulations for application to private carriers.

* * *

Fieldwork Done Before Proposals

THE proposed Regulations are the outgrowth of contacts with 23 organizations and hundreds of individual operators in the trucking field. Much of this task, together with the immense one of digesting and codifying many conflicting views, fell to H. H. Kelly, chief of the safety section of the Bureau of Motor Carriers.

The job has been done well, and however one may differ with certain details of the proposed regulations, the Bureau of Motor Carriers has been fair in seeking information from all sides, and in providing opportunity for criticism of the codified results. Every person whose work is connected in any way

Louisiana Sets Dealer-Law Mark

THE Louisiana legislature has before it five bills designed to vocalize into "protective" legislation some of the outstanding grievances of automobile dealers. One bill would permit dealers to enter and enforce a fair trade practice agreement. Another would require filing with the secretary of state of Louisiana copies of contracts between dealer and factory, a third would forbid tire manufacturers to sell tires to controlled outlets, a fourth would provide for repurchase by car manufacturers of dealers' stocks in the event of contract cancellation, the fifth would prevent dealers from being forced to deal with a designated finance company.

As of July 7, the uniform-contract measure had passed the Louisiana House and had been favorably reported in the Senate. The fair-trade practice act is said to be a dead issue for the present. The tire bill is still in committee, while the bill providing for re-purchase of car stocks has been passed by the House and reported favorably in the Senate. The finance-company measure has passed both houses.

This galaxy of laws, under the pretense of protecting free competition, would undoubtedly hamper it so far as manufacturers are concerned. The complete program may be held up for the present by a constitutional provision (yes, they have them in Louisiana) providing for early adjournment of the Legislature.

—H. H.

By P. M. Heldt

ON the fourth of this month the present patent system of the United States was one hundred years old. It was on July 4, 1836, that the Congress of the United States adopted a new Patent Act providing for the issuance of patents only after an examination of the applications, and the current series of U. S. patents started with No. 1, issued on July 13, 1836, to John Ruggles of Thomaston, Me. Patents had been issued by the Federal Government previous to that time, but since no examination as to novelty or practicability was made, they had little value beyond that of an official record of the claims of the applicant. There were patent laws even in Colonial days and the first patent ever granted on this side of the Atlantic is said to have been one issued in 1641 to Thomas Winslow, by the General Court of Massachusetts-Bay Colony, for a process of making salt. That was nearly three hundred years ago.

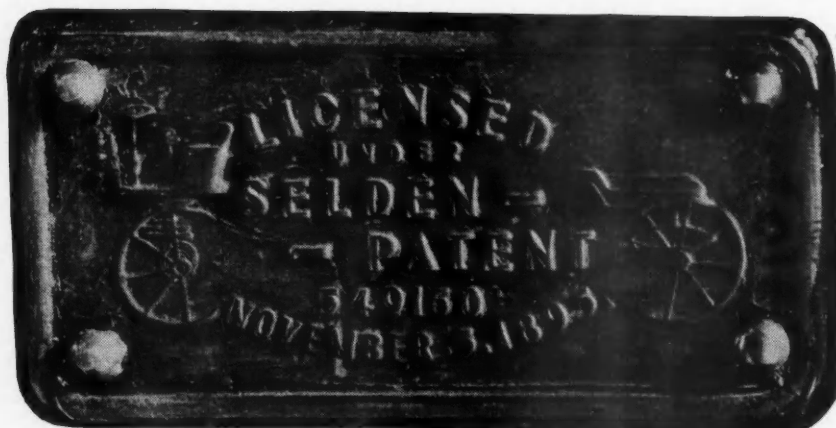
The Patent Act of 1836 proved a strong stimulant to inventive effort. During the one hundred years which have elapsed considerably more than two million patents have been issued, or approximately 400 per week. The rate at which patents were issued naturally increased with the growth in population and with increasing mechanization and industrialization of the country. Patent No. 500,000 was issued in 1893, or after the law had been in effect for 57 years. Patent No. 1,000,000 was issued Aug. 8, 1911, to Francis H. Holton of Akron, Ohio, for a vehicle tire, hence the second half-million patents were issued during a period of eighteen years. Patent No. 1,500,000 was issued on July 1, 1924, to Simon Lake of Milford, Conn., for a submersible vessel for navigation under ice. So it took thirteen years to issue the third half-a-million patents. Patent No. 2,000,000 was issued on April 30, 1935, to Joseph Ledwinka of Philadelphia, and related to a vehicle-wheel construction. Thus the period for half-a-million patents to issue was cut down to eleven years.

It is noteworthy that all of the three

last-mentioned patents, Nos. 1,000,000, 1,500,000, and 2,000,000, covered automotive inventions, in the wider sense of the term, and the automotive industries have been responsible for a large proportion of the patents taken out since the beginning of the century.

While the patent law undoubtedly has contributed to the remarkable industrial development of the past century, the original act had many defects, most of which were eliminated as they became recognized. Even today it is held by many that the patent law needs modification in order to better meet present-day conditions. Recently the Science Advisory Board, which is a branch of the National Research Council, has proposed a number of changes. The board, for instance, wants special patents courts on which technical men act as judges. These judges would engage specialists in the art in any particular case to report upon and advise them on the technical points involved in the particular case. The board also emphasized the necessity of raising the standard of invention. What it evidently had in mind is the fact that of the many thousands of patents issued each year, only a very small propor-

tion are ever worked, indicating that the remainder have little commercial value. The point may be illustrated by conditions in the passenger-car industry. As is well known, in this industry there exists a cross-licensing agreement, sometimes referred to as a patent pool, which controls about 3000 patents. It is estimated that there are approximately 300,000 automobile patents alive at the present time, yet all except two or three of the active car manufacturers in this country produce their cars under the 3000 patents covered by the agreement. Even allowing for the fact that a large number of the 300,000 patents apply to accessories which are not produced in car



Do you remember this "decoration" which appeared on all cars made by members of the Association of Licensed Automobile Manufacturers, from the beginning of the Selden litigation until it was held finally that the patent was not infringed?



Probably the most expensive patent model ever built—from the standpoint of the defendants—

The car shown here, with George B. Selden at the wheel, was built while the Selden patent case was in court. The object was to show that a car built generally in accordance with specifications of the Selden patent and employing only such accessories and appliances as were known at the time the application was made (in 1877) could be made to run

After 100 Years—

factories, it will be realized that a very large proportion of the so-called live (that is, unexpired) automobile patents are really dormant and valueless. Amendments to the patent law were made from time to time to eliminate weaknesses or to adapt the practice to changing conditions. For instance, during the earlier period applicants were given two years in which to file amendments in case some of their original claims could not be allowed. If the amended claims were again found

The U. S. Patent office still operates in a system established essentially in 1836; recalling that some of its most famous cases were of automotive origin, while new automotive devices have dominated the "Gazette" for the last two decades

objectionable for any reason, the applicant was again allowed two years to make changes, and so on. It was found that this system under certain conditions encouraged abuse, permitting applicants to keep their patents pending long periods, to be able to reap some of the fruits of development work done by others. The period during which amended claims can be filed has now been shortened.

The unpleasant side of the patent system is that of patent litigation, which latter is usually hazardous and very expensive. The Government grants the inventor his patent, but it does not guarantee the validity of same. If the patentee thinks his rights are being infringed by any one he must resort to the courts. In such a case if the product alleged to be covered by the patent is an important one, a determined defense will naturally be made, and it is then often discovered that the patentee was preceded by others, that his invention was anticipated, and that the claim under which infringement is alleged should not have been allowed. Usually there are two main questions involved in any patent suit, the first being as to the validity of the patent or some particular claim thereof, the second as to actual infringement.

Both the automobile and the aircraft industries had very unpleasant experiences in patent litigation during their early years. It seems that in the early stages of a developing industry the patent system may actually be a hindrance instead of a help to development, for it is conceivable that a party obtaining a broad patent may "rest on his oars," depending on others to carry out any detail development that may be necessary to obtain a marketable product, and any one knowing of the existence of the master patent will naturally be inclined to "keep off."

As already mentioned, the cross-licensing agreement of the Automobile Manufacturers Association covers approximately 3000 patents. Approximately one-half of these are free, any member subscribing to the agreement being at liberty to use them without the payment of dues. On the remaining patents small royalties must be paid.

AMA Cross-Licensing Agreement

The A. M. A. cross-licensing agreement was first entered into on Jan. 1, 1915, and all but one or two of the members of what is now known as the Automobile Manufacturers Association joined it. All of the members who signed the agreement threw their patents into the pool, with certain definite exceptions. What were then referred to as Class

B patents, that is, patents exceptional in scope or fundamental in nature, were to be excepted. Secondly, commercial vehicle patents were excepted. This exception was made because the commercial-vehicle industry was as yet in its infancy and it was hard to foresee what its technical development would be. However, this exception covered a rather small class, as it did not apply to patents on details of design that, while primarily evolved in connection with commercial vehicles, were equally applicable to passenger cars.

Design patents were also excluded from the agreement. These for the most part related to body styles, and the members did not want to encourage copying of body styles, which would have tended to kill originality.

Agreement Lasted 10 Years

The original agreement extended over a period of 10 years, and those who subscribed to it agreed to contribute not only the patents in their possession at the time the agreement was made, but also all of the patents which might be issued to them or assigned to them during the life of the agreement. In 1925 the agreement was renewed for a period of five years, but a change was made in that only the patents in possession of the subscribers at the time were included. In 1930 the agreement was renewed without change in conditions, while in 1935 the 1930 agreement was extended for a period of five years.

While many of the patents under which extensive litigation was carried on, and especially the Selden patent, were the cause of untold worry and annoyance to manufacturers, as far as the automobile industry is concerned, these patents had the effect of bringing the manufacturers into close and harmonious relationship, and the establishment of the so-called patent pool entirely eliminated patent litigation within the industry. It also resulted in the creation of an efficient patent department within the Automobile Manufacturers Association which is of great help in defending the industry and its members against attacks from without. George C. Arvedson is the head of this department of the A.M.A.

A patent cross-licensing system is in effect also in the aircraft industry. Prior to the war, aircraft manufacturers in this country were greatly harassed by the patent situation; they could either ignore existing patents and run the risk of being sued for infringement, or they could recognize the validity of the patents and acquire licenses under them, but as some of these patents were basic in character, and li-

cense fees of \$1,000 or more per plane were asked, the latter alternative was not very attractive. In 1917, when the United States entered the war it became apparent that something had to be done to relieve the situation if the War and Navy Departments were to be supplied with planes in sufficient number. F. D. Roosevelt, then Acting Secretary of the Navy, in January, 1917, appointed a Government Committee which conferred with the patent owners and aircraft manufacturers and suggested a cross-licensing plan on the lines of similar plans then in effect in other industries. Such a plan was adopted and in July, 1917, the Manufacturers Aircraft Association was formed to administer this agreement. Later the Government likewise acquired licenses under the Association, covering planes built in Government factories, imported, etc. Under the original agreement a flat payment of \$200 was required and every subscriber had the right to use all of the patents owned by all subscribing members. This agreement is still in effect but changes in its terms have been made repeatedly.

Important modifications were made toward the end of 1928. After that date patents acquired by a company which "secured the performance of a function not theretofore known," in other words, which were more or less basic, were excepted from the general agreement. The exceptional character of the patent might be determined by the price paid therefor or by the amounts spent in its development. Subscribers to the cross-licensing agreement may still make use of any patents belonging to any of the subscribers, but in the case of the basic patents they are required to pay a license fee, the amount of the fee being determined by a Board of Arbitration. At the present time about 850 patents are covered by the cross-licensing agreement of the aircraft industry, and about 50 of these, or some 6 per cent, are included in the new class of patents subjected to license fees, created by the amendment of 1928.

Selden Patent Case

The most celebrated patent case in automobile history, and probably the most outstanding one in the history of patent litigation, was that involving the Selden patent (U. S. patent No. 549,160 issued Nov. 5, 1895). George B. Selden, a patent attorney of Rochester, N. Y., had applied for a patent on a vehicle propelled by an internal combustion engine on May 8, 1878. The patent law at that time allowed an applicant two years in which to file amend-

ments if any objections were raised by the examiners, and by repeatedly taking advantage of this provision of the law, Selden kept his application pending until 1895, when popular interest in motor vehicles had just begun to develop. That patent broadly covered the application of "liquid hydrocarbon engines of the compression type" to road vehicles, among the features claimed being a crankshaft turning faster than the driving wheels, and a clutch by means of which the engine could be disconnected from the drive.

An exclusive license under this patent was acquired by the Electric Vehicle Company of Hartford, Conn., and this company promptly began to notify manufacturers of gasoline automobiles that they were infringing the patent. No notice being taken of the warning, suit was brought against the Winton Motor Carriage Co. But before this suit came to trial, Winton took out a license under the patent. Many other manufacturers of gasoline automobiles followed suit, and the result was the organization, during the early part of 1903, of the Association of Licensed Automobile Manufacturers. However, a considerable number of manufacturers did not recognize the patent and did not join the A.L.A.M., including two important ones, viz., Thomas B. Jeffery & Co. (now the Nash Motor Co.) and the Ford Motor Co. There followed a most hectic period in the history of the industry. The "Licensed Association" gave public notice that it was owner of the alleged basic patent, which gave it the exclusive right to the manufacture, sale and use of vehicles propelled by internal combustion engines, and warned dealers and users against infringement. Some of the unlicensed manufacturers, and particularly Ford, issued counterblasts guaranteeing full protection to their dealers and owners.

Finally in the Fall of 1903 suit was brought against the Ford New York dealer. The defense was taken over by the Ford Motor Co. and both sides prepared for a strenuous fight, commensurate with the interests involved. Hearings were held and testimony was taken over a period of more than five years. Finally in September, 1909, a decision was rendered by the District Court pronouncing the patent valid and infringed. However, Ford immediately took an appeal, and in January, 1911, the Circuit Court of Appeals rendered a decision which reversed the District Court. The patent, it held, was valid, but the Ford car was not an infringement, inasmuch as the patent showed drawings of a Brayton engine, and this was evidently the type the inventor had in mind when he used the expression "liquid hydrocarbon engine of the com-

pression type." The Ford car carried an engine of the Otto type.

This spelled the end of the Selden patent as a master patent of the automobile industry. At the time it was "knocked out" it had only about one more year to run. None of the license fees paid under it were ever returned, so far as is known.

Spark Plugs Were in Patent Litigation Too

An early detail patent which played an important part in the history of the industry and brought a liberal reward to the parties which finally gained control of it was the Canfield spark plug patent. Early spark plugs gave a good deal of trouble from sooting, a conducting layer of carbon forming on the surface at the inner end of the insulator, "shorting" the plug. It occurred to Frank W. Canfield, a Michigan lumberman, that this trouble could be prevented by forming the inner end of the plug with a deep recess, which would remain filled with burnt gases during the interval between explosions, so that no combustion could take place in the deeper section of the recess at least, and no carbon would be deposited there. Canfield accordingly took out U. S. patent No. 612,701, dated Oct. 18, 1898. At that time high-tension ignition was almost unknown in this country, but evidently the inventor had had some personal experience with an engine equipped with it. Canfield died a few months after the issuance of his patent, and the latter passed through several hands, until finally it was brought to the attention of the Associated Patents Company, a subsidiary of the Association of Licensed Automobile Manufacturers. By that time high-tension ignition had come into wide use, and the spark plugs all had the recess at the inner end covered by the Canfield patent. Counsel for the Company therefore urged acquisition of the patent, so that its members might be protected against infringement suits. The Associated Patents Company did acquire the patent and later transferred it to A. R. Mosler, an established spark plug manufacturer, for manufacture under it for the general market. All of the members of the Association Patents Co. retained a license under it. It was reported at the time that Mosler paid \$3,500 for the patent (which expired in 1915), and the purchase undoubtedly proved a fortunate one.

There has been much patent litigation also in the tire and rim industry, the most sensational case in that field, involving millions of dollars, being the Perlman rim case. Patent No. 1,052,270, on a demountable rim, issued in Febru-

ary, 1913, to L. H. Perlman, on an application filed May 21, 1906, covered "the combination with a wheel body of a demountable rim therefor, and a locking element having a tapering portion that is adapted to be moved to exert pressure against the rim outwardly radially of the wheel body, and to act as a wedge laterally, said locking element having an engagement with the wheel body."

Perlman in 1913 brought suit for infringement against the Standard Welding Co. of Cleveland, then the largest manufacturer of demountable rims. Such rims had been used on racing cars as far back as 1905, and at the time the suit was brought had become standard equipment on most of the higher-grade cars. A favorable decision was obtained by Perlman in the District Court for the Southern District of New York in September, 1915. Standard Welding Company appealed, but the decision of the lower court was upheld by the Court of Appeals in a decision handed down on Feb. 15, 1916. The patent was held valid and infringed, and an injunction was issued against the Standard Welding Co. somewhat later. It was reported that Perlman offered Standard Welding a license on condition that it pay \$1.00 per set of five rims for all rims manufactured by it from the time the patent was issued till the time infringement was established, and \$1.50 per set for all rims manufactured thereafter, but this offer was refused.

Tied Up the Entire Industry

This sudden tying up of the largest rim manufacturing company put the automobile industry in an awkward position. It was right in the middle of the selling season and cars piled up in shipping departments and overflowed into factory yards, it being impossible to ship them because no rims were available. Perlman then organized the Perlman Rim Corporation, with a capital stock of \$10,000,000, in which a number of men in leading executive positions in the industry participated. In fact, Perlman Rim Corporation became a United Motors Service branch.

Demountable rims were being manufactured also by a number of other concerns, notably the Firestone Tire & Rubber Co., and shortly after the establishment of the Perlman Rim Corp. suit was brought against Firestone. Then suddenly, on June 11, 1917, the suit was dismissed, on motion of counsel for the Perlman Rim Corporation, "without prejudice to either party." The decree provided that the exhibits of both parties should be impounded (Turn to page 66 please)

One Shift-t

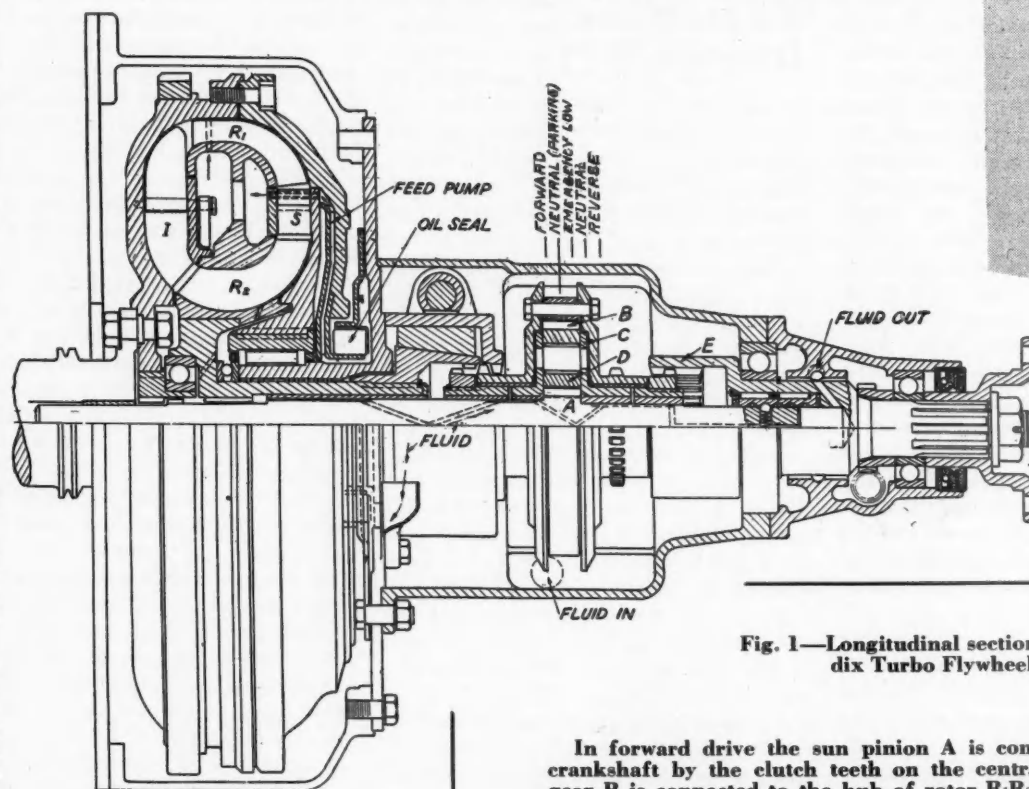


Fig. 1—Longitudinal section through Bendix Turbo Flywheel Gear

A NEW hydro-mechanical transmission, known as the Bendix Turbo Flywheel Gear, has been developed by the engineering department of Bendix Products Corporation, for use on buses, trucks and private passenger cars, and for industrial applications. Since the objection is often raised against new types of transmission that their control is not standard and that drivers would have to "learn over" if such transmissions were to be adopted generally, it is probably best to point out at once that the control operations required by the Bendix Turbo Flywheel Gear are identical with the first control operations performed when starting a car with a conventional transmission. Control of the flywheel gear is decidedly simpler than that of the conventional transmission, as with the former there are no operations corresponding to shifting into second and

In forward drive the sun pinion A is connected to the crankshaft by the clutch teeth on the central shaft; ring gear B is connected to the hub of rotor R-R₂ by a toothed clutch between the hydraulic unit and the planetary assembly, and planetary carrier C is connected to tail shaft E by a toothed clutch within the cup-shaped inner end of the shaft. Both the sun pinion and the ring gear turn in the same direction, and they carry the planetaries and carrier C along with them. When the drive is "direct," the sun pinion and ring gear turn at substantially the same speed, and they then contribute to the power transmitted in proportion to their pitchline velocities, which are proportional to their pitch diameters (1 : 3 in the drawing). At the start, of course, there will be considerable slippage in the hydraulic device; the ring gear then turns at lower speed than the sun pinion, and the proportion of the power transmitted by the hydraulic unit is then relatively less.

In "emergency low" ring gear B is locked to the housing by the toothed clutch between the hydraulic unit and the planetary assembly, and therefore remains stationary; planetary carrier C remains connected to tail shaft E and sun pinion A is connected to the hub of the hydraulic rotor by the clutch teeth on the central shaft. Thus the power is first transmitted through the hydraulic unit and then through the planetary assembly, which latter, with the sun pinion as the driving and the planetary carrier as the driven member gives a reduction ratio of 4 : 1.

In "reverse" the sun pinion remains connected to the hydraulic rotor, the planetary carrier is now locked to the housing by the toothed clutch between the hydraulic unit and the planetary assembly, and the ring gear is clutched to the tail shaft. It is evident that in this case, with the planetary carrier stationary, the ring gear turns in opposition to the sun pinion and the tail shaft in opposition to the crankshaft, hence the direction of the car is reversed. The reduction ratio (in the drawing) is now 3 : 1.

the Rest is Automatic

in a new Bendix hydro-mechanical transmission

By Adiel Y. Dodge *

high. Thus any one familiar with the operation of the conventional transmission need not acquire a new technique and can at once safely drive a car with the Turbo flywheel. What makes the control so simple is that although there are four positions for the shift lever, no shifting is done after the car has been started, all subsequent changes in speed ratio or torque ratio taking place automatically. The four positions of the shift lever correspond to the following

nished with the gear, as well as means for using the hydraulic unit as a brake. Only a single train of gears is required to perform the various gear functions. The entire assembly is somewhat more compact than the conventional layout. While there are four positions for the shift lever, in normal operation only two of these positions are used, viz., position 2 (neutral) and position 3 (forward). It is not necessary to shift into neutral when approaching stop lights

or when crawling or stopping in traffic; in fact, shifting is required only when it is desired to reverse.

The characteristics of the Bendix Turbo flywheel are further improved by the introduction of a "two-path power flow" or "series-multiple hook-up." The arrangement of the various elements of the transmission is such that at no time is the full torque output of the engine transmitted by the hydraulic driving element.

An emergency low-speed ratio is secured hydro-mechanically without the addition of extra gears, and lower speed ratios are available for descending treacherous grades. A hydro-mechanical reverse is obtained with the same gears that are used for the emergency low speed. By means of the hydro-mechanical emergency low gear the car may be made to climb over a curb or out of a deep rut, or ascend a grade in excess of 50 per cent with ease, provided there is sufficient traction.

Fig. 1 shows a longitudinal section of the entire transmission. In the hydraulic unit, shown at the left, *I* is the impeller; *R*₁, the first rotor; *S*, the reaction member, and *R*₂, the second rotor. The impeller *I*, of course, is part of the flywheel, both rotors are secured to the hollow driven shaft or sleeve, while the reaction member *S* is mounted upon a stationary hub extending inward from the rear portion of the flywheel housing in such a manner that it is

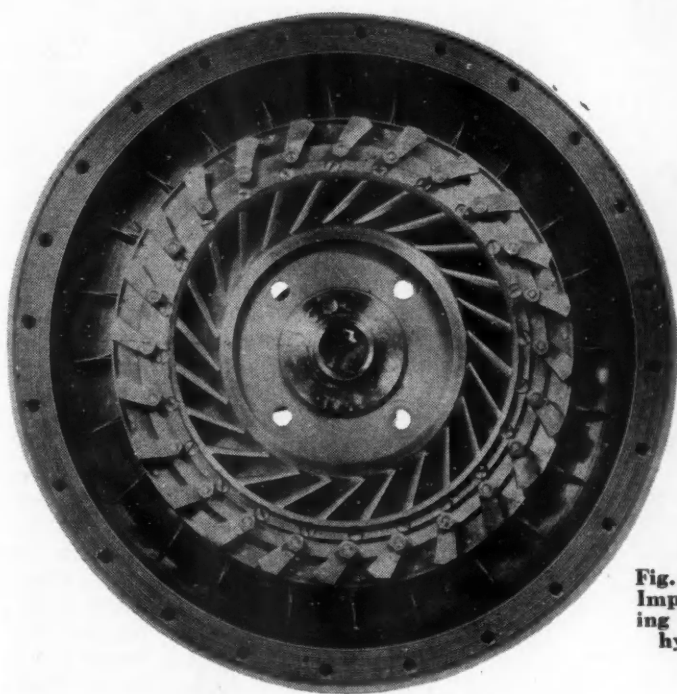
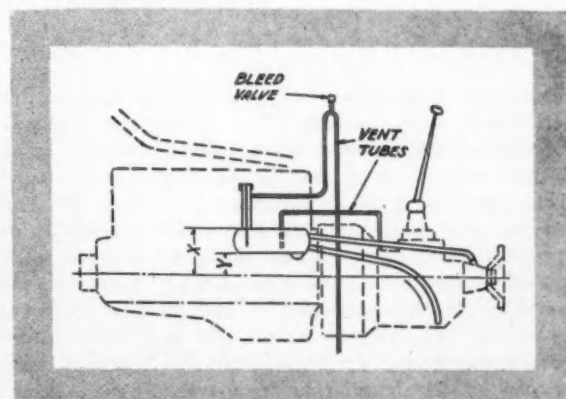


Fig. 3 — (Left),
Impeller or driving
member of
hydraulic unit

operating conditions:

Position	Direction	Combination of elements and torque ratio
1.	Reverse	Hydraulic turbo. Mechanical reverse. Variable ratio.
2.	Neutral	Car may be moved around freely.
3.	Forward	All ratios down to 1:1.
4.	Forward	Emergency low. Ratio variable.
A positive direct drive can be fur-		

Fig. 2 — (Right),
Reserve tank and
circulatory sys-
tem of Bendix
Turbo Flywheel



*Consulting engineer Bendix Products Corp.



Fig. 4—(Above), Stator or reaction member of hydraulic unit

Fig. 5—(Below), Rotor or driven member of hydraulic unit, front-end view

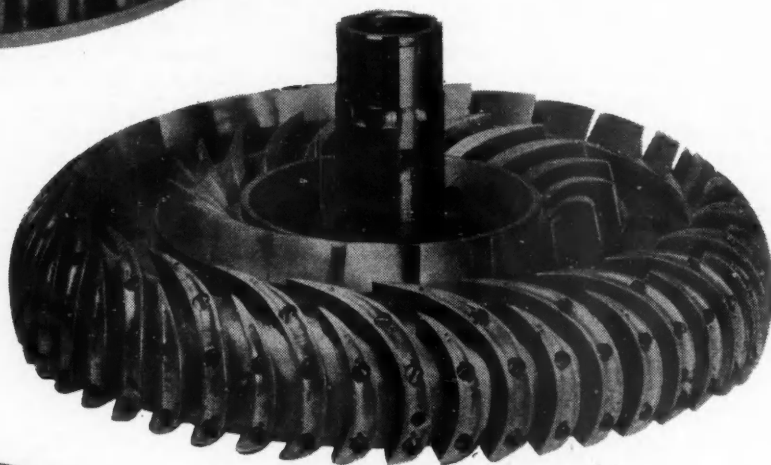
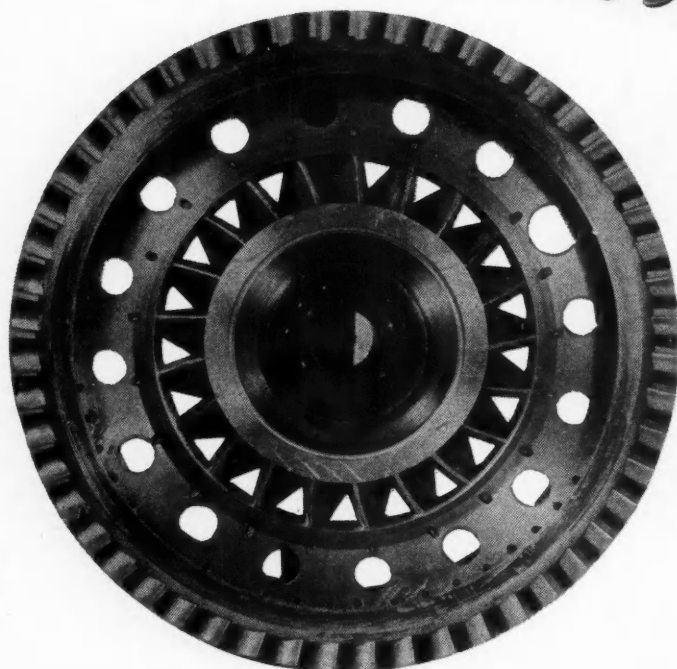


Fig. 6—(Right), Rotor or driven member of hydraulic unit, side view



free to turn around its axis in one direction but not in the other.

A central shaft extends from one end of the transmission to the other, the whole mechanism being virtually carried on this shaft. During the main forward drive this central shaft is coupled to the flywheel or crankshaft by means of clutch teeth upon it and in the bore of the flywheel center, and so turns at engine speed. At the start, 50 per cent of the engine power passes

from the flywheel to the sun gear *A* of the planetary assembly through this central shaft. Later, as a one-to-one drive is approached, the power through the central shaft diminishes and reaches 25 per cent of the engine power at 1:1. At the start, 50 per cent of the power goes through the hydraulic unit. The ring gear *B* is turned by the rotors. The tail shaft *E* is turned by the planet cage *C*, this latter being caused to turn by the planet gears *D*, which receive

their power from the sun and ring gears *A* and *B*.

The reaction-vane wheel *S* is mounted on an improved one-way clutch and roller bearing combined. It is free to turn in the direction of the crankshaft, but will not turn counter thereto.

In operation, the speed ratio between engine shaft and propeller shaft changes automatically to meet the driving conditions and varies from the max-

imum reduction ratio down to 1:1. The rate at which the change in ratio takes place depends on road conditions, such as gradient, road surface, etc., and on the position of the accelerator pedal, which latter is controlled by the driver in the usual way. Starting from rest, he may step lightly or heavily on the pedal. Should he start with the accelerator pressed down all the way, the car will start in a low gear ratio, that is to say, the engine will make a considerable number of turns to one of the propeller shaft, and the torque on the propeller shaft will be many times that on the crankshaft. Should the driver keep the accelerator down, the ratio will change gradually until it becomes 1:1. Under normal level-road conditions and with the accelerator fully depressed, the 1:1 ratio will be attained at about 44 m.p.h. From this speed up the car will be substantially in direct drive, as all parts will revolve almost as a unit.

With this transmission, the shift is in a straight line or what used to be called "progressive," which has the advantage that it affords the greatest possible liberty with respect to location of the shift lever. This lever may be placed in the conventional position (centrally in the front compartment), on the instrument board, or on the steering column. Bendix Electro-Vac shift may be used. The gear ratios can

be varied to suit any particular conditions.

In the foregoing outline of the control operations performed in bringing the car up to speed, it was assumed that the accelerator was pressed all the way down. "Direct drive" may be secured at much lower speeds by depressing the accelerator only partly.

Since no actual shifting of gears takes place in this transmission, quiet helical or herringbone gears may be used. Although the transmission is automatic to a large extent, changing the speed and torque ratios without the intervention of the driver, the latter retains control over its operation in that he may engage either the emergency low, the forward, or the reverse gear, or shift into the neutral position. With this transmission the engine can be cranked by pushing or towing the car, and there is practically no free-wheeling. When in "direct-drive," all parts turn together almost as a unit.

The new Bendix Turbo Flywheel is claimed to possess all of the good features of a fluid flywheel and in addition the ability to increase torque for starting and hill climbing. Although numerous attempts have been made in the past to develop a torque-increasing fluid flywheel (or torque converter) that would have satisfactory efficiency near the direct-drive point, not much success seems to have been achieved along this line previously, which lends particular interest to this new development. This transmission really incorporates two new and interesting developments, viz., a combined fluid flywheel and hydraulic torque converter built in one unit, and the ingenious two-path power-flow hook-up, which further increases the utility and efficiency of the device.

Special attention is called to the circulating system. Fluid is allowed to pass from the turbo flywheel through the central shaft to a special collector joint located between the two bearings of the tail shaft. The fluid discharged

from the turbo flywheel is picked up at this point and conducted by tubing to a combined reservoir and cooler, which is located slightly above the center line of the transmission. Fluid returns from the reservoir to the gear box, entering the gear box in such a way that the swirl of fluid in the gear box automatically limits the fluid level therein, by setting up a counter centrifugal head. This counter centrifugal head must of necessity strike a balance equal to the fluid head of the reservoir. In this way, a limited amount of fluid remains in the gear box at high speeds. There is always sufficient fluid in the gear box to create the centrifugal head necessary to back the fluid up into the reservoir or retain it in the reservoir, whichever the case may be. This insures sufficient head to feed fluid to the

centrifugal feed pump, an auxiliary centrifugal pump built into the cover of the flywheel. The feed pump forces fluid into the flywheel, not only keeping the flywheel full, but maintaining a slight pressure head therein. With this arrangement, there is only one point to be sealed, and that is a comparatively low-pressure point lying between the feed pump and the fluid passage from the gear box. This joint is a more-or-less conventional oil seal and is subjected to the pressure of a hydraulic head of only a few inches. In this way, all packing boxes have been eliminated and troublesome leaks around the central shaft are done away with. As a matter of fact, a certain portion of fluid is allowed to leak around the central shaft; oil grooves and oil holes are provided through the central shaft to lubricate the bearings. In this way, a certain portion of oil escapes into the gear box before reaching the final passage to the reservoir. While this system eliminates many troublesome leak problems, it also furnishes additional cooling area, since the entire surface of the transmission is available for cooling purposes. The gears run in a bath of thin oil, which is permissible because the helical form of the teeth assures quiet operation. Owing to a special staggered arrangement, a helix angle of only 11 deg. gives tooth overlap, and it is apparent that with such a small helix angle there is comparatively little end thrust.

Fig. 2 shows the circulatory system. It will be noted that there are three

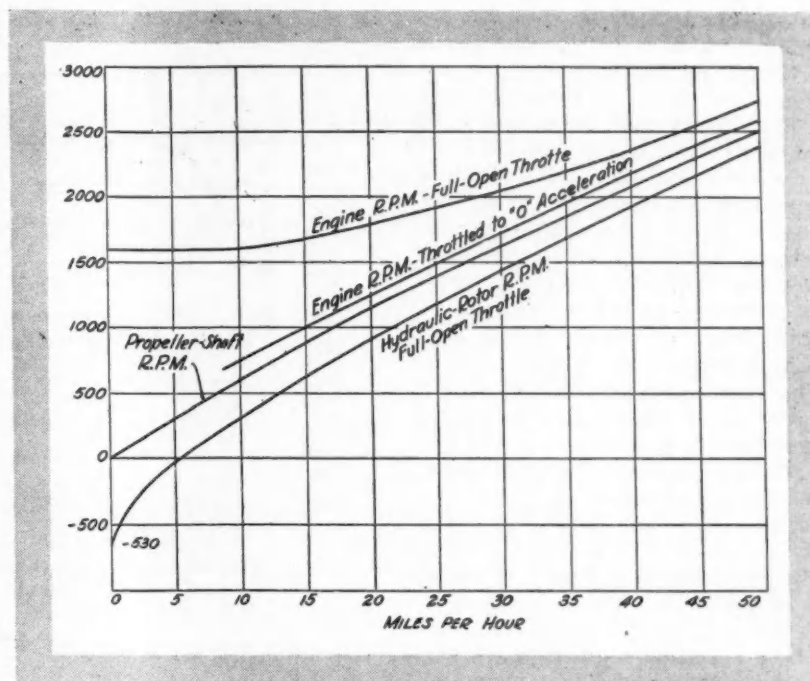


Fig. 8—Relations between engine speed, rotor speed and car speed

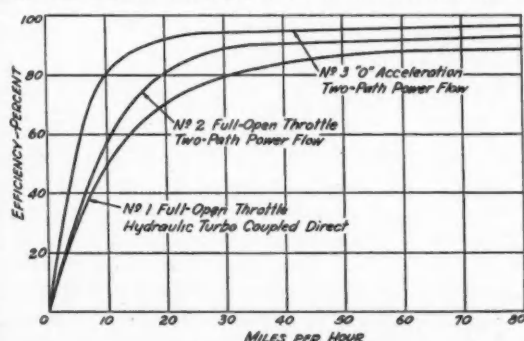


Fig. 7—Efficiency curves of Bendix Turbo Flywheel gear and its parts

tubes leading to the reservoir. The one coming from the top of the gear box is merely for ventilation.

Curve 1 in Fig. 3 shows the efficiency of the turbo flywheel alone under full load, while curve 2 shows the efficiency of the combined unit (turbo flywheel plus two-path power flow) under full load, and curve 3 the efficiency under part load, that is, that particular throttle opening which is required to maintain uniform speed on level road.

The makers of the device call particular attention to the improvement in riding qualities due to the use of the fluid drive. Torsional vibration of the engine is said to be effectively damped out, and road shock so completely cushioned by the propeller shaft and the transmission system that it is entirely lost.

Many engineers have been wondering how it can be possible to secure such high efficiencies as are claimed for these small fluid couplings, when the efficiencies of the largest and best hydraulic turbines are much lower. There is a two-fold explanation for this seeming discrepancy. In the first place, the largest source of power loss in large hydraulic turbines is the discharge water, which carries considerable energy with it. There is no corresponding loss in a fluid coupling, as any energy left in the fluid after passing the rotor blades is returned to the impeller. Another important cause of loss in hy-

draulic turbines is the fact that the fluid passes over stationary parts, such as the fixed casing and guide vanes. In a fluid coupling the casing is not fixed, and in the case of the Bendix Turbo Flywheel the casing is turning at driver speed and the guide vanes are fixed only a small part of the time. Hence this source of power loss is largely eliminated.

In conclusion, the following advan-

tages are claimed for the Bendix Turbo Flywheel, as compared with the conventional automobile transmission: More miles per gallon; 15 per cent reduction in engine speed (due to a 20 per cent smaller rear-axle ratio); 10 per cent better acceleration; no shock loads on driving parts; improved general performance, and no shifting of gears or clutch operation as long as the car is being driven forward.

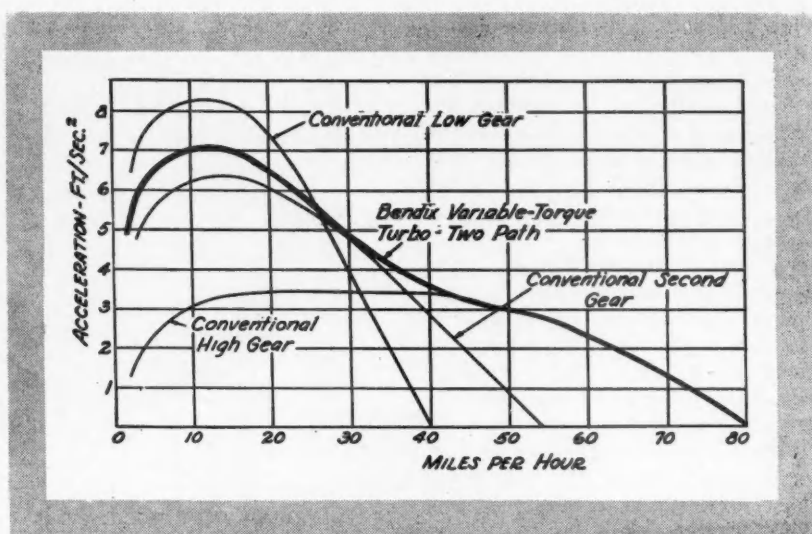


Fig. 9—Acceleration curves of car with Bendix Turbo Flywheel Gear and with a conventional transmission in the different gears

France Honors Her Great

FRANCE this year is celebrating centenaries of two of her great men who were pioneers in electrical science, Coulomb and Ampère, after whom the electrical units of quantity and rate of flow were named.

Charles Augustus de Coulomb was born at Angoulême on June 14, 1736, so it is the second centenary of his birth which is being celebrated. He was educated as a military engineer and served for a time in the French West Indies and at Rochefort, Aix and Cherbourg. He started to contribute papers to the Academy of Sciences while still at Martinique. Later at Rochefort he had ample opportunity for experimental work, and he carried on investigations on general mechanical subjects, particularly torsion. In 1785 he turned to electrical research, discovered the laws of electric and magnetic attraction and repulsion, and developed the torsion balance for measuring these forces of attraction and repulsion. At the outbreak of the

revolution, in 1789, he lost his position in Paris. For a time he was connected with the commission charged with the determination of the new (metric) system of weights and measures. However, the greater part of his later years was spent in retirement in the country. He died in 1806. Among the honors bestowed upon him were appointments as lieutenant-colonel of engineers and as a knight of the Order of St. Louis, and membership in the Legion of Honor. Thomas Young, British scientist and author, ranked him with Franklin, Aepinus and Cavendish in the electrical sciences and recorded that his moral character was reputed to have been as correct as his mathematical results.

André-Marie Ampère was born at Polemieux near Lyons on Jan. 22, 1775, and died on June 10, 1836, so that it is the centenary of his death which is being commemorated. He showed great mathematical ability at an early age and at 12 was reading the works of

Euler, while at 16 he mastered the *Mechanique Analytique* of Lagrange. At the age of 18 he had the misfortune of losing his father, who had been a magistrate at Lyons and had taken part in the defence of the city against the forces of the Convention. The revolution and the loss of his father made him turn away from his studies for a time. Toward the end of the century he started to teach physics, and in 1824 he became professor of experimental physics at the College de France. In 1820 he learned of the observation of Oersted in Copenhagen regarding the influence of a wire carrying an electric current on a magnetic needle, and this induced him to take up the study of electrical phenomena. He did very extensive experimental work in this field and published his results in two volumes, the first of which, *Electrodynamic Observations*, was published in 1822, and the other, *Theory of Electrodynamic Phenomena*, eight years later.

The Horizons of Business

—By Joseph Stagg Lawrence

Defining the Issue

WE are not in the habit of picking quarrels with our contemporaries. It has always seemed somewhat presumptuous on the part of one writer to attempt to correct, scold or interpret another writer to his readers. There is also the danger of selecting passages, in good faith, from their context and straining their reasonable meaning. It is so easy to do this that the writer who habitually "clarifies" or criticizes a fellow craftsman may be suspected of setting up straw men. This may mean that he is inveterately contentious, excessively conceited or, suffers from a poverty of original thought. None of these is flattering and it is for this reason together with the fact that Walter Lippmann is the ablest and most distinguished editorial writer of his times that we hesitate to pick on his July 4 story in the New York *Herald Tribune*.

Mr. Lippmann is discussing the steel crisis and, in his effort to be judicial, bends back so far that he loses his balance and leaves a seriously inaccurate impression of the facts.

As Lippmann Sees the Issue

"In the steel industry there are three 'outside' organizations contending for control of labor relations. There is the Committee for Industrial Organization headed by Mr. John L. Lewis. There is the American Federation of Labor, headed by Mr. William Green. There is the American Iron and Steel Institute which professes to speak for the managers of all the plants. The three have this much in common: That none believes that the actual employees and the actual managers and owners of each plant should work out their own method of collective bargaining; that all three believe that the fundamental policy must be laid down by some centralized outside authority. They differ only in that Mr. Lewis wants one kind of centralized outside labor organization to determine the fundamental policy, that Mr. Green wants another kind, and that the Institute wants a centralized employers' organization.

"In this conflict between vertical unions, horizontal unions, and company unions, all three contenders are outsiders in the sense that they seek to formulate the labor policy of the whole industry rather than to let it be worked out in each plant. All three seek to supersede the actual workers and actual managers in the mills where steel is manufactured by subjecting them to a national policy directed from Washington or New York. They are all for a united front, differing only as to who shall be the master.

"It is against this sort of thing that American opinion is in rebellion when it applauds those who denounce monopoly.

"The labor leaders and the gentlemen of the Institute between them are following a line of action which leads directly to a collectivist economy. No private power can for long hope to be allowed to regulate nationally an industry like steel.

"... both parties have made gestures in their platforms indicating that they are prepared to abandon the idea of a concentrated regulation of industry by private monopolists or by government officials.

"He (anyone) must oppose the common conception of the three, of Mr. Lewis, Mr. Green, and the Institute, that this industry shall be governed from the outside and from on top, from a central point and by blanket policies."

The Authority of the Institute

In stating that the Institute "professes to speak for the managers of all plants" Mr. Lippmann implies that this organization in some manner has usurped an authority to which it has no legitimate claim. Furthermore he fails to note the distinction between a positive dictation of policy to be pursued in particular plants and a common resistance to the imposition of a uniform policy by some outside agency. The fact is that the Institute is the authorized spokesman for the managements of steel plants producing about 90 per cent of the steel in the country.

The managements themselves took the initiative in the formation of the Institute. Though operating with full approval of the government, at least during the NRA period of the New Deal under rules published and approved by Washington, this body derives its authority from its members. In the origin of that authority, the manner of its exercise, the objectives of the Institute and the interests of its officers there is simply no comparison that can be made either with the Committee for Industrial Organization or the American Federation of Labor.

Stakes in Steel Industry

The organizers of the Committee for Industrial Organization have no proprietary, managerial or direct employee interest in the industry. They are a mobile group of roving agitators operating under the direction of professional labor leaders who own no stock in the industry, who have no managerial responsibility and hold no jobs in the industry. Their reward will consist, if they are successful, in the power derived from their position as a constant menace to the peace of the industry, a power based upon nuisance value. Add to that the tribute which they will be able to collect from workers for the privilege of holding their jobs.

All this may be said of the American Federation of Labor. The only issue here is which labor body will have the right to harass management and collect a dollar a month from the workers who hold their jobs under sufferance of the labor barons. The Committee for Industrial Organization and the American Federation of Labor derive no authority from any legitimate interest in the industry, managerial, proprietary or labor. They are merely rival groups of ambitious labor leaders disputing the privilege of exploiting an opportunity for power, an opportunity kept open by a complaisant government at the cost of industrial peace and continued recovery. It is difficult to see how the same right to speak for the industry can be attributed equally to the Committee for Industrial Organization, the American Federation of Labor and the Iron and Steel Institute.

(Turn to page 63, please)

Mechanical Specifications

These Specifications are brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-door Sedan	Wheelbase (Ins.)	Tire Size (Ins.)	ENGINE															CHASSIS					
					No. of Cylinders, Bore and Stroke	Tumble H.P.	Piston Displacement (Cu. Ins.)	Maximum Brake H.P. at Specified R.P.M.	Compression Ratio (to-1)	Displacement Factor ††	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch	Type and Make	Gearset Make	Universal Type and Make	Rear Axle Type and Make	Service Brake Type and Make
1	Auburn..... 654	\$ 795	120	6.00/16	6-3 1/2 x 4 1/2	22.5	209.9	85-3500	6.20	37.4	Al.	Whit.	Al.	Pur.	AC.	Str.	Buf.	A.	USL	P.Long.	WG.	Nb-Mec	3/4 Col.	BH.	
2	Auburn..... 852	1095	127	6.50/16	8-3 1/2 x 4 1/2	30.0	279.9	115-3600	6.50	41.4	Al.	Whit.	Al.	Pur.	AC.	Str.	Buf.	A.	USL	P.Long.	Det.	Nb-Mec	3/4 Col.	BH.	
3	Auburn..... SC852	1545	127	7.00/16	8-3 1/2 x 4 1/2	30.0	279.9	150-4000	6.50		Al.	Whit.	Al.	Pur.	AC.	Str.	Buf.	A.	USL	P.Long.	Det.	Nb-Mec	3/4 Col.	BH.	
4	Austin.....		75	3.75/18	4-2.2 x 3	7.8	45.6	13-3200	5.30		CL.	Spir.	Al.	No.	No.	Til.	Buf.	A.	USL	P.Rock.	WG.	F-Spi.	3/4 Sal.	M.m.	
5	Buick..... 36-40	885	118	6.50/16	8-3 1/2 x 3 7/8	30.6	233.0	93-3200	5.65	39.6	CL.	LB.	Ala.	No.	AC.	Str.	Wal.	D.	Del.	P.Own.	Own.	m-Spi.	3/4 Own.	OH.	
6	Buick..... 36-60	1090	122	7.00/15	8-3 1/2 x 4 1/2	37.8	320.2	120-3200	5.45		CL.	LB.	Ala.	AC.	AC.	Str.	Wal.	D.	Del.	P.Own.	Own.	m-Spi.	3/4 Own.	OH.	
7	Buick..... 36-80	1255	131	7.00/16	8-3 1/2 x 4 1/2	37.8	320.2	120-3200	5.45	40.7	CL.	LB.	Ala.	AC.	AC.	Str.	Wal.	D.	Del.	P.Own.	Own.	m-Spi.	3/4 Own.	OH.	
8	Buick..... 36-90	1695	138	7.50/16	8-3 1/2 x 4 1/2	37.8	320.2	120-3200	5.45		CL.	LB.	Ala.	AC.	AC.	Str.	Wal.	D.	Del.	P.Own.	Own.	m-Spi.	3/4 Own.	OH.	
9	Cadillac..... V8-60	1895	121	7.00/16	8-3 1/2 x 4 1/2	36.4	322.0	125-3400	6.25	45.7	CL.	Mor.	Ala.	No.	AC.	Str.	Old.	D.	Del.	P.Long.	Own.	Nb-Mec.	3/4 Own.	BH.	
10	Cadillac..... V8-76 & 75	2445	131-38	7.50/16	8-3 1/2 x 4 1/2	39.2	346.0	135-3400	6.25	(a)	CL.	Mor.	Ala.	No.	AC.	Str.	Old.	D.	Del.	P.Own.	Own.	Nb-Mec.	3/4 Own.	BH.	
11	Cadillac..... V12-80 & 85	3145	131-38	7.50/16	12-3 1/2 x 4 1/2	46.9	368.0	150-3600	6.00	(b)	CL.	Mor.	Ala.	Han.	AC.	DL	Old.	D.	Del.	P.Own.	Own.	Nb-Mec.	3/4 Own.	BH.	
12	Cadillac..... V16-90	7250	154	7.50/17	16-3 x 4	57.5	452.0	185-3800	6.00	43.7	CL.	Mor.	Ala.	Cu.	AC.	DL	Own.	D.	Del.	dp.Own.	Own.	Nb-Mec.	3/4 Own.	EP.	
13	Chevrolet..... Max. Con.	640	113	5.50/17	6-3 1/2 x 4	26.3	206.8	79-3200	6.00	35.2	CL.	Own.	CL.	No.	AC.	Car.	Own.	D.	D.	P.Own.	Own.	m-Own.	3/4 Own.	OH.	
14	Chevrolet..... Max. Ind.		113	5.50/17	6-3 1/2 x 4	26.3	206.8	79-3200	6.00	34.6	CL.	Own.	CL.	No.	AC.	Car.	Own.	D.	D.	P.Own.	Own.	m-Own.	3/4 Own.	OH.	
15	Chevrolet..... Std.	575	109	5.25/17	6-3 1/2 x 4	26.3	206.8	79-3200	6.00	39.5	CL.	Own.	CL.	No.	AC.	Car.	Own.	D.	D.	P.Own.	Own.	m-Own.	3/4 Own.	OH.	
16	Chrysler..... Six	875	118	6.25/16	6-3 1/2 x 4 1/2	27.3	241.5	93-3400	6.00	41.5	CL.	Ch.	Ala.	Pur.	Bur.	Car.	NS.	A.	Wil.	P.B&B.	Own.	Nb-UP.	3/4 Own.	LH.	
17	Chrysler..... DeLuxe 8	1045	121	6.50/16	8-3 1/2 x 4 1/2	33.8	273.8	105-3400	6.20	43.3	CL.	Ch.	Ala.	Pur.	AC.	Str.	NS.	A.	Wil.	P.B&B.	Own.	Nb-UP.	3/4 Own.	LH.	
18	Chrysler..... Airflow 8	1345	123	7.00/16	8-3 1/2 x 4 1/2	33.8	323.5	115-3400	6.20	41.8	CL.	Ch.	Ala.	Pur.	AC.	Str.	Bur.	A.	Wil.	P.B&B.	Own.	Nb-UP.	3/4 Own.	LH.	
19	Chrysler..... Air Imp. 8	1475	128	7.50/16	8-3 1/2 x 4 1/2	33.8	323.5	130-3400	6.50	42.4	CL.	Ch.	Ala.	Pur.	AC.	Str.	Bur.	A.	Wil.	P.B&B.	Otwg.	Nb-UP.	3/4 Own.	LH.	
20	Chrysler..... Airflow 8	137	127	7.50/16	8-3 1/2 x 4 1/2	33.8	323.5	130-3600	6.50		CL.	Ch.	Ala.	Pur.	AC.	Str.	Bur.	A.	Wil.	P.B&B.	Otwg.	Nb-UP.	3/4 Own.	LH.	
21	Cord.....	810	199	6.50/16	8-3 1/2 x 3 3/8	39.2	288.6	125-3500	6.50		Al.	Whit.	Al.	No.	AC.	Str.	Buf.	A.	USL	P.Long.	Own.	Nb-UP.	3/4 Own.	LH.	
22	De Soto..... Airstream 6	810	119	6.25/16	6-3 1/2 x 4 1/2	27.3	241.5	93-3400	6.00	(c)	CL.	Ch.	Ala.	Pur.	Bur.	Car.	NS.	A.	Wil.	P.B&B.	WG.	Nb-UP.	3/4 Own.	LH.	
23	De Soto..... Airflow 6	1095	115 1/2	6.50/16	6-3 1/2 x 4 1/2	27.3	241.5	100-3400	6.50	35.6	CL.	Ch.	Ala.	Pur.	AC.	Str.	NS.	A.	Wil.	P.B&B.	Own.	Nb-UP.	3/4 Own.	LH.	
24	Dodge..... Six	735	116	6.00/16	6-3 1/2 x 4 1/2	25.3	217.8	87-3600	6.50	40.0	CL.	Ch.	Ala.	Pur.	AC.	Str.	NS.	A.	Wil.	P.B&B.	Own.	Nb-UP.	3/4 Own.	LH.	
25	Duesenberg..... J	142-153 1/2	142-153 1/2	7.00/19	8-3 1/2 x 4 1/2	45.0	419.7	320-4200	5.20		CL.	LB.	Al.	Pur.	Y.	Str.		D.	Exi.	dp.Long.	Own.	m-Spi.	3/4 Own.	PH.	
26	Ford..... V8	580	112	6.00/16	8-3 1/2 x 3 3/8	30.0	221.0	85-3800	6.30	41.2	Al.	Gear	Al.	No.	Yes	Str.	Own.	O.	Own.	P.Os	Own.	m-Own.	3/4 Own.	OM.	
27	Graham..... 6-80	665	111	6.00/16	6-3 x 4	21.6	169.6	70-3500	6.80	37.1	Al.	LB.	Als.	No.	AC.	Mar.	Old.	D.	Wil.	P.Ill.	WG.	Nb-Spi.	3/4 Spi.	OH.	
28	Graham..... 6-80A	625	111	5.25/17	6-3 x 4	21.6	169.6	70-3500	6.80		Al.	LB.	Als.	No.	AC.	Mar.	Old.	D.	Wil.	P.Ill.	WG.	Nb-Spi.	3/4 Spi.	OH.	
29	Graham..... 6-90	795	115	6.00/16	6-3 1/2 x 4 1/2	25.3	217.8	85-3300	6.70	39.7	Al.	LB.	Als.	No.	AC.	Mar.	Old.	D.	Wil.	P.Ill.	WG.	Nb-Spi.	3/4 Spi.	OH.	
30	Graham..... 6-90A	745	115	6.00/16	6-3 1/2 x 4 1/2	25.3	199.1	80-3300	6.70	44.2	Al.	LB.	Als.	No.	AC.	Mar.	Old.	D.	Wil.	P.Ill.	WG.	Nb-Spi.	3/4 Spi.	OH.	
31	Graham S. C. 6, 110	895	115	6.25/16	6-3 1/2 x 4 1/2	25.3	217.8	112-4000	6.70		Al.	LB.	Als.	Fram	AC.	Mar(a)	Old.	D.	Wil.	P.Ill.	WG.	Nb-Spi.	3/4 Spi.	OH.	
32	Hudson..... 6-63	785	120	6.00/16	6-3 x 5	21.6	212.0	93-3800	6.25	39.3	CL.	Ge.	Al.	No.	AC.	Car.	Old.	A.	Nat.	P.Own.	Own.	Nb-Spi.	3/4 Own.	BH.	
33	Hudson..... 8, 64-5-6-7	830	120-127	6.25/16	8-3 x 4 1/2	28.8	254.0	113-3800	6.00	(d)	CL.	Ge.	Al.	No.	AC.	Car.	Old.	A.	Nat.	P.Own.	Own.	Nb-Spi.	3/4 Own.	BH.	
34	Hupmobile..... 618-G	855	118	6.00/16	6-3 1/2 x 4 1/2	29.4	245.3	101-3600	5.75	45.4	CL.	Mor.	Als.	No.	Bur.	Car.	Old.	A.	Wil.	P.B&B.	WG.	Nb-Spi.	3/4 Spi.	LH.	
35	Hupmobile..... 621-N	1035	121	6.50/16	8-3 1/2 x 4 1/2	32.5	303.2	120-3500	5.80	47.3	CL.	Mor.	Als.	No.	Bur.	Car.	Old.	A.	Wil.	P.Own.	WG.	Nb-UP.	3/4 Spi.	LH.	
36	Lafayette.....	3610	675	113	6.00/16	6-3 1/2 x 4 1/2	25.3	217.7	83-3200	5.61	39.4	CL.	Whit.	Als.	No.	AC.	Str.		A.	USL	P.B&B.	Own.	Nb.	3/4 Own.	BH.
37	La Salle..... 36-50	1185	120	7.00/16	8-3 x 4 1/2	28.8	248.0	105-3600	6.25	39.0	CL.	Whit.	Al.	No.	AC.	Str.	Old.	D.	Del.	P.B&B.	Own.	Nb-Mec	3/4 Own.	BH.	
38	Lincoln..... Zephyr	1275	122	7.00/16	12-2 1/2 x 3 3/4	36.3	267.3	110-3900	6.7	42.5	Al.	Gear	St.		Yes.	Str.	Own.	O.	Own.	P.Os	Own.	m-Own.	3/4 Own.	MO.	
39	Lincoln..... V12	138-145	138-145	7.50/17	12-3 1/2 x 4 1/2	46.8	414.0	150-3400	6.38	41.5	Ala.	Ch.	Ala.	Pur.	Yes.	Str.	Own.	A.	Exi.	P.Long.	Own.		FF Tim.	M.	
40	Nash..... Ambassador	885	125	6.25/16	6-3 1/2 x 4 1/2	27.3	234.8	93-3400	5.70	36.8	CL.	Whit.	Als.	Own.	AC.	Str.		A.	USL	P.B&B.	Own.	Nb-Mec	3/4 Own.	BH.	
41	Nash..... Amb. Super 8	995	125	6.50/16	8-3 1/2 x 4 1/2	31.2	260.8	102-3400	5.25	36.5	CL.	Ch.	Als.	Own.	AC.	Str.		A.	USL	P.B&B.	Own.	Nb-Mec	3/4 Own.	BH.	
42	Nash.....	400	740	117	6.00/16	6-3 1/2 x 4 1/2	27.3	234.8	90-3400	5.61	42.2	CL.	Whit.	Als.	Own.	AC.	Str.		A.	USL	P.B&B.	Own.	Nb.	3/4 Own.	BH.
43	Oldsmobile..... F36	795	115	6.50/16	6-3 1/2 x 4 1/2	26.3	213.3	90-3400	6.00	39.2	CL.	Whit.	Ala.	No.	AC.	Car.	Hay.	D.	D.	P.B&B.	Own.	Nb-Mec	3/4 Own.	BH.	
44	Oldsmobile..... L36	910	121	7.00/16	8-3 x 4 1/2	28.8	240.3	100-3400	6.20	40.2	CL.	Whit.	Ala.	No.	AC.	Car.	Buf.	D.	D.	P.B&B.	Own.	Nb-Mec	3/4 Own.	BH.	
45	Packard..... 36-120B	1075	120	7.00/16	8-3 1/2 x 4 1/2	33.8	282.0	120-3800	6.50	41.8	Al.	Mor.	Als.	AC.	Str.	Old.	A.	Pre.	P.Long.	Own.	Nb-Mec	3/4 Own.	LH.		
46	Packard..... 36-120	1235	127-34-39	7.00/17	8-3 1/2 x 5	32.5	320.0	130-3200	6.00	37.9	Al.	Mor.	Als.	Pur.	AC.	Str.	Bur.	DT.	Pre.	P.Long.	Own.	Nb-UP.	3/4 Own.	BP.	
47	Packard..... Super 8	2990	132-39-44	7.00/17	8-3 1/2 x 5	32.5	384.8	150-3200	6.30	40.7	Al.	Mor.	Als.	Pur.	AC.	Str.	Old.	DT.	Pre.	P.Long.	Own.	Nb-Spi.	3/4 Own.	BP.	
48	Packard..... Twelve	3960	138-144	7.50/17	12-3 1/2 x 4 1/2	56.7	473.0	175-3200	6.40	44.3	Al.	Mor.	Als.	Pur.											

of American Passenger Cars

Car Manufacturers and Supersede All Others Previously Published

57

Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS		Piston Pin Diameter	Piston Pin Locked in	VALVES										IGNITION										FRONT AXLE					Line Number
			No. and Width Comp.	No. and Width Oil			Head Diameter and Seat Angle				Operating Tappet Clearance		Intake Valve Opens Before or After T.C.		No. Teeth on Flywheel	Breaker Points Gap (In.)	Timing				Rods Removed From	Crankpin Diameter (In.)	Crankpin Length (In.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	Caster (Degrees)	Camber (Degrees)	Toe-in (Inches)	King Pin Inclination (Degrees)			
							Inlet (In.)	Inlet Seat Angle (Degrees)	Exhaust (In.)	Exhaust Seat Angle (Degrees)	Stem Diameter (In.)	Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing			No. of Degrees	No. of Flywheel Teeth	Spark Plug Gap (In.)	Spark Occurs TC										No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	
R...	Ch-J-6...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	342	010H	010H	012	7 1/2	2 1/2	110	018	025	3B...	1B...	Au B.	2 1/2	1 1/2	6 16	3 1/2-4	1.5	1/2	7 1/2	1			
R...	Ch-J-6...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	342	010H	010H	012	7 1/2	2 1/2	110	018	025	3B...	1B...	Au B.	2 1/2	1 1/2	8 20	2-3	1.5	1/2	7 1/2	2			
R...	Ch-J-9...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	342	010H	010H	012	7 1/2	2 1/2	110	018	025	3B...	1B...	Au B.	2 1/2	1 1/2	8 20	2-3	1.5	1/2	7 1/2	3			
O...	Ch-C-7...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	342	003H	004H	TC	TC	80	020	020			Re	1 1/2	1 1/2	4 6	5	1 1/2	1/2	7 1/2	4				
S...	AC-H9...	2-1/2	1-1/2	3/8	R...	1 1/2	45	1 1/2	45	371	015	015	019	8B...	3 1/2	146	015	025	2B...	1 1/2	A. A.	2 1/2	1 1/2	6 13 1/2	3-3 1/2	1 1/2	1/2	4 1/2	5			
S...	AC-H9...	2-1/2	1-1/2	3/8	R...	1 1/2	45	1 1/2	45	371	015	015	019	14B...	6B...	156	015	025	10B...	4 1/2	A. A.	2 1/2	1 1/2	8 17	1 1/2-2 1/2	1 1/2	1/2	4 1/2	6			
S...	AC-H9...	2-1/2	1-1/2	3/8	R...	1 1/2	45	1 1/2	45	371	015	015	019	14B...	6B...	156	015	025	10B...	4 1/2	A. A.	2 1/2	1 1/2	8 17	1 1/2-2 1/2	1 1/2	1/2	4 1/2	7			
S...	AC-H9...	2-1/2	1-1/2	3/8	R...	1 1/2	45	1 1/2	45	371	015	015	019	14B...	6B...	156	015	025	10B...	4 1/2	A. A.	2 1/2	1 1/2	8 17	1 1/2-2 1/2	1 1/2	1/2	4 1/2	8			
S...	AC-K9...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	341	AA...	AA...	0	TC	TC	156	015	026	5B...		Ad A.	2 1/2	1 1/2	7 30	1 1/2-2	1 1/2	1/2	4 1/2	9			
S...	AC-K9...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	341	AA...	AA...	0	TC	TC	156	015	026	5B...		Ad A.	2 1/2	1 1/2	7 29	1 1/2-2 1/2	1 1/2	1/2	4 1/2	10			
S...	AC-G6...	3-1/2	1-1/2	3/8	P...	1 1/2	45	1 1/2	45	341	AA...	AA...	0	TC	TC	113	021	026	4B...	1 1/2	A. A.	2 1/2	1 1/2	9 19	1 1/2-2 1/2	1 1/2	1/2	4 1/2	11			
S...	AC-G6...	3-1/2	1-1/2	3/8	P...	1 1/2	45	1 1/2	45	341	AA...	AA...	0	TC	TC	113	016	026	4B...	1 1/2	A. A.	2 1/2	1 1/2	10 24	1 1/2-2 1/2	1 1/2	1/2	4 1/2	12			
O...	112 AC-K11...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	30	342	006H	013H	006	9B...	3 1/2	133	018	032	5B...	1 1/2	Ad A.	2 1/2	1 1/2	5 15	3-1 1/2	1-1 1/2	1/2	4 1/2	13			
O...	112 AC-K11...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	30	342	006H	013H	006	9B...	3 1/2	133	018	032	5B...	1 1/2	Ad A.	2 1/2	1 1/2	5 15	0	1 1/2	1/2	4 1/2	14			
O...	112 AC-K11...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	30	342	006H	013H	006	9B...	3 1/2	133	018	032	5B...	1 1/2	Ad A.	2 1/2	1 1/2	5 15	2 1/2-3 1/2	1-1 1/2	1/2	4 1/2	15			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	010	TC	TC	146	020	025	TC	TC	Au A.	2 1/2	1 1/2	6 19	1 1/2	1	1/2	4 1/2	16			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	011	2B...	1 1/2	146	018	025	TC	TC	Au A.	2 1/2	1 1/2	6 22	1 1/2	1	1/2	4 1/2	17			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	011	2B...	1 1/2	146	018	025	TC	TC	Au A.	2 1/2	1 1/2	6 17	2	1	1/2	4 1/2	18			
G...	Ch-H-10...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	011	2B...	1 1/2	146	018	025	5A...	2A...	Au A.	2 1/2	1 1/2	6 17	2	1	1/2	4 1/2	19			
G...	Ch-H-10...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	011	2B...	1 1/2	146	018	025	5A...	2A...	Au A.	2 1/2	1 1/2	6 17	2	1	1/2	4 1/2	20			
G...	Ch-J-9...	2-1/2	1-1/2	3/8	F...	1 1/2	30	1 1/2	45	342	010H	010H	012	7 1/2	2 1/2	146	018	025	3B...		Au A.	2 1/2	1 1/2	6 17	2	1	1/2	4 1/2	21			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	010	TC	TC	146	020	025	TC	TC	Au A.	2 1/2	1 1/2	6 19	1 1/2	1	1/2	4 1/2	22			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	010	TC	TC	146	020	025	5A...	2A...	Au A.	2 1/2	1 1/2	6 19	2	1	1/2	4 1/2	23			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	011	5A...	2 1/2	146	020	025	4A...	1 1/2	A. A.	2 1/2	1 1/2	5 15	2	1	1/2	4 1/2	24			
G...	Ch-6M...	3-1/2	1-1/2	3/8	F...	1 1/2	30	1 1/2	30	341	015C	015C	025	6B...	2B...	119	021	025	1 1/2 B...		Ad	2 1/2	1 1/2	12 32	3	1	1/2	4 1/2	25			
O...	105 Ch-7...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	013C	013C		9 1/2 B...	3B...	112	013	025	4B...	1 1/2	Au A.	2 1/2	1 1/2	5 22	7	1/2	1/2	4 1/2	26			
R...	Ch-7...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	340	010H	010H	012	4 1/2 B...	1 1/2	130	018	025	2B...	1 1/2	Au A.	2 1/2	1 1/2	5 11	2 1/2	1	1/2	4 1/2	27			
R...	Ch-7...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	340	010H	010H	012	4 1/2 B...	1 1/2	130	018	025	2B...	1 1/2	Au A.	2 1/2	1 1/2	5 11	2 1/2	1	1/2	4 1/2	28			
R...	Ch-J-9...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	340	010H	010H	012	4 1/2 B...	1 1/2	130	018	025	2B...	1 1/2	Au A.	2 1/2	1 1/2	5 11	2 1/2	1	1/2	4 1/2	29			
R...	Ch-J-9...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	340	010H	010H	012	2A...		130	018	025	TC	TC	Au A.	2 1/2	1 1/2	5 15	2 1/2	1	1/2	4 1/2	30			
R...	Ch-J-9...	2-1/2	1-1/2	3/8	R...	1 1/2	30	1 1/2	45	340	010H	010H	012	4 1/2 B...	1 1/2	130	018	025	2B...	1 1/2	Au A.	2 1/2	1 1/2	5 15	2 1/2	1	1/2	4 1/2	31			
G...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	010	10 1/2 B...	4B...	134	020	022	TC	TC	Au A.	1 1/2	1 1/2	5 13	3 1/2-4 1/2	1-1 1/2	1/2	4 1/2	32			
R...	Ch-J-8...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006H	008H	010	10 1/2 B...	4B...	134	020	022	TC	TC	Au A.	1 1/2	1 1/2	5 13	3 1/2-4 1/2	1-1 1/2	1/2	4 1/2	33			
G...	107 Ch-C-7...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	010	013	014	2B...	1 1/2	112	018	028	7B...	2 1/2	Ad A.	2 1/2	1 1/2	6 18	1 1/2	1	1/2	4 1/2	34			
G...	113 Ch-C-7...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	340	006	013	010	1A...	1/4	109	016	028	7B...	2 1/2	Ad B.	2 1/2	1 1/2	8 21 1/2	1 1/2	1	1/2	4 1/2	35			
G...	100 Ch-7...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	341	015	015	015	5A...	1 1/2	104	020	023	10B...	3B...	Au A.	2 1/2	1 1/2	7 19	2 1/2	1	1/2	4 1/2	36			
S...	AC-K9...	2-1/2	1-1/2	3/8	P...	1 1/2	30	1 1/2	45	341	006C	009C	015	6A...	2 1/2	145	015	025	8B...	3 1/2	Au B.	2 1/2	1 1/2	7 10 1/2	2	1	1/2	4 1/2	37			
O...	105 Ch-J-9...	2-1/2	1-1/2	3/8	P...	1 1/2	45	1 1/2	45	311			004C	006C	004	21B...	6 1/2	116	020	022	7B...	2 1/2	Au B.	2 1/2	1 1/2	6 27	7	1/2	4 1/2	38		
O...	105 Ch-7...	2-1/2	1-1/2	3/8	P...	1 1/2	45	1 1/2	45	340	004C	006C	004	21B...	6 1/2	116	020	022	7B...	2 1/2	Au B.	2 1/2	1 1/2	12 32	1 1/2	1	1/2	4 1/2	39			
G...	100 AC-K12...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	372	015H	015H	015				020	025			A.	2 1/2	1 1/2	7 17 1/2	2 1/2	1	1/2	4 1/2	40			
G...	90 AC-K12...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	372	015H	015H	015				020	025	15B...		B.	2 1/2	1 1/2	8 21	2 1/2	1	1/2	4 1/2	41			
G...	100 Ch-7...	2-1/2	1-1/2	3/8	F...	1 1/2	45	1 1/2	45	341	015	015	015	5A...	1 1/2	104	020	025	10B...	3B...	Au A.	2 1/2	1 1/2	7 18	2 1/2							

The Forum

To Obviate Side Thrust

Editor, AUTOMOTIVE INDUSTRIES:

I note frequent references in your magazine to cylinder wear. It always seemed to me that cylinder wear is caused primarily by the side thrust of the piston against the cylinder wall. I wonder whether it has ever occurred to any of the engineers to adopt a plan I have had in mind for some time, which seems to me to be calculated to obviate all of the side thrust.

The plan consists of a dual crankshaft arrangement with two connecting rods operating from each piston, so that the two side thrusts exactly balance each other. The accompanying sketch indicates certain center points and lines of directions of parts.

One rather striking feature of the device is the fact that the powerstroke extends through more than a semicircle; in the sketch it would be about 197 deg., the reason for which is apparent from a study of the lines of the figure.

The fact that the load would be divided between the two shafts would make it possible to reduce the size, strength and weight of each as compared with a single crankshaft, so that

the additional weight would not be prohibitive.

It may be possible that this balance of the side thrust on the cylinder would eliminate most, if not all, of the engine vibration, so that a 4-cyl. engine would run as smoothly as a 6 or 8. Nothing but practical experimentation could determine this point.

A. L. PARSONS.

By far the greatest wear occurs at that portion of the cylinder bore which is covered by the uppermost piston ring when the crank is in the top-center position. At that point of the cycle there is no side thrust on the cylinder wall, and the wear referred to therefore is not due to side thrust. At about the middle of the length of the cylinder bore there is usually somewhat greater wear in the direction of side thrust than at right angles thereto, which indicates that side thrust is a factor so far as wear of this part of the bore is concerned. It is, however, the wear at the upper end of the stroke which causes trouble and necessitates reconditioning of the engine.

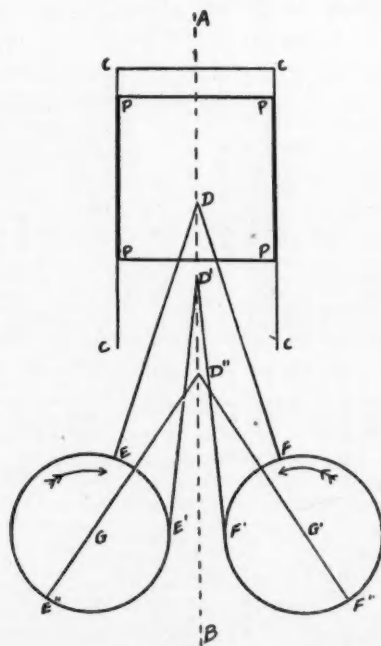
The plan suggested by our correspondent was suggested repeatedly during the early years of the automobile

industry, but more to eliminate vibration than to eliminate wear. The following is a quotation from *The Horseless Age* of July 12, 1899:

"A gasoline carriage at the exhibition"—at Richmond near London—"which comprises probably more novel points than any other is that exhibited by F. W. Lanchester of 59 Lincoln's Inn, Corporation Street, Birmingham."

**** The motor, which is arranged at about the center of the frame, under the seat, comprises two horizontal cylinders, 5-in. diameter, 5-in. stroke, facing each other in the same line. Two connecting rods are attached to each piston. There are two cranks, independent of each other, and two flywheels also independent of each other but keyed respectively to the two crankshafts, one of which is 3 in. above the center line of the engine, the other 3 in. below it. One connecting rod from each piston goes to the upper crankpin and one to the lower, a kind of diamond-shaped linkage when the pistons are at midstroke being thus formed. It may be stated that the two crankshafts revolve in opposite directions ****

In the same report an illustration is given of the Elan motor, which had two vertical cylinders whose pistons connected to two parallel crankshafts that were geared together.—EDITOR.



Sketch from Mr. Parsons explains points in his letter

Change with Retrogression

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the article "Finding Out What the Consumer Thinks About the New Cars" appearing in the December 21 issue.

It would be possible for me to write at length upon what I have found to be desirable and undesirable in the hope that some manufacturer might take pity upon a mere car owner and actually furnish something that really is wanted. Bitter experience, however, leads me to believe that this could not be expected.

Car owners seem to be divided roughly into three classes—those who know something about automobile engineering but can't do anything about it. Others who know a little about it and wouldn't if they could. The remaining class, vastly in the preponderance, know

nothing about it and care less. Judging by some of the things found in current models, the latter have had much to do with their design. If less attention were paid to externals and more to internals, there would be fewer "internals" referring to current models.

We hear much of the pains taken by automobile manufacturers to determine by investigation just what the public desires in their products and are puzzled by the fact that each year the result bears but little reflection of our own desires.

Were we to question anyone responsible for this fact, the prompt answer would be that our own ideals are unique, yet, over twenty years of first hand experience in owning, driving and personally servicing his cars, leads the

(Turn to page 61, please)

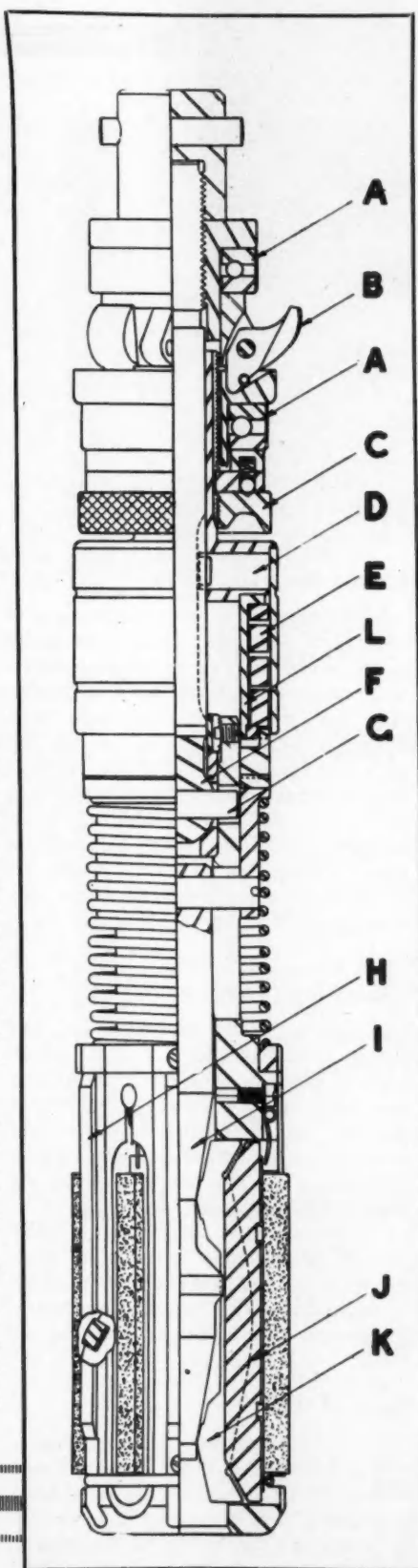
New Hone By Micromatic

A NEW full-automatic honing tool incorporating some unique features in design and operation is being offered by the Micromatic Hone Corp., Detroit, Mich. This tool has been in production use for some time on applications following either reaming or precision boring on cylinder blocks.

It is claimed that stock removal for clean-up after reaming in some applications averages 0.0025 to 0.0035 in. in the roughing operation, in 45 seconds' actual honing time, making 30 strokes, yielding 200 to 250 bores per set of stones. In the finish operation, approximately 0.0005 in. stock is removed in 30 strokes, yielding approximately 1000 bores per set of stones. Following precision boring, one honing operation removes 0.001 to 0.0015 in. stock in approximately 60 seconds, making about 40 strokes, yielding approximately 250 to 300 bores per set of stones. Accuracies obtained with these tools average 0.0003 in. for out-of-round and 0.0005 in. for taper, it is stated.

These results have been effected by the adoption of a one-piece slotted body, which is said to allow approximately twice as much area for side bearing of the stone holders as has been offered in their flange type tools; double cone expansion which provides two supporting points for the stone holders; controlled individual compensation provided for the stone holders to assure uniform, free cutting action during the honing operation and to provide for uniform wear of stones; and a new type adjustment for diameter, permitting the operator to adjust the tool with one hand.

Referring to the drawing, expansion of the abrasive members is effected automatically by the contraction of the three expansion fingers "B" as they enter the operating bushing; likewise collapse of the abrasive members is effected automatically when the fingers are released from the operating bushing on the final upward stroke. This feature of automatic expansion is maintained during the entire period in which the fingers are held in contracted



position within the operating bushing. Ball thrust bearings "A" prevent the finger and bracket assembly from spinning in the bushing.

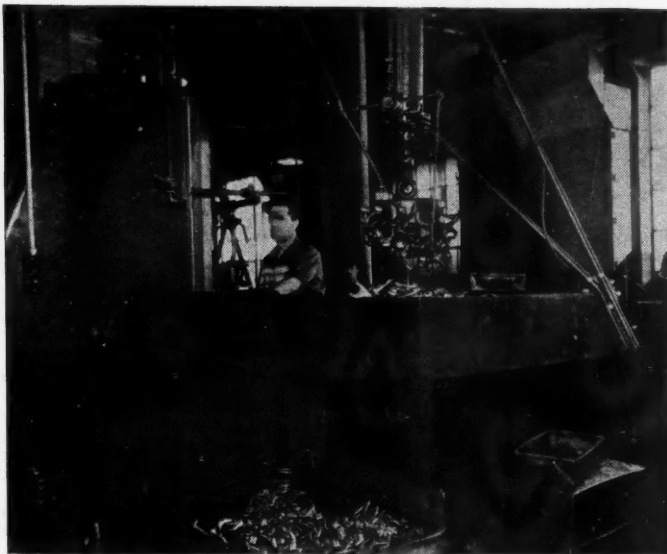
Selective limits of expansion are controlled by setting adjustment collar "C," which sets up a predetermined compression in cone feed spring "E" in relation to the desired amount of stock to be removed. This compression is expended through the medium of cone "I" in the expansion travel of the abrasive members during the complete honing cycle.

The cone feed spring "E," is assembled in cage "L" under a fixed compression, so as to control a constant initial pressure. This compression also maintains uniform pressure on the abrasive members. Where the tools are operated to follow a reaming operation which leaves a uniform amount of stock to be removed, the adjustment collar "C" is set to allow for stone wear only; diameter size is controlled by the number of strokes.

Full universal action of the tool body on the shaft is provided as shown in shaft end "F" and pins "G." The compensating stone holder members "J" and "K" are held against the cone "I" by retaining springs in such manner as to assure the positive collapse of the tool.

Free from any contact with the expansion mechanism, six fiber guides "H" are inserted into the body member of the tool, with provision for backing up these guides with resilient cork cushioning members. These guides, which are longer than previously offered, remain under pressure, in contact with the cylinder wall, serving to center and guide the body of the tool within the bores.

This improved honing tool is said to offer faster and easier operation, more rapid and uniform cutting action due to quicker break-down of abrasive structure, greater accuracy of adjustment of the tools by reduction of error due to human elements, reduction of sensitiveness to overrun, and lower cylinder wall pressure.



Unique application of Curtis air hoist at Buick Motor Co. Hoist is provided with an electromagnet for lifting shifter forks from big tote boxes and carrying them in batches to the operator of the Cincinnati broaching machine at the left.

PRODUCTION LINES

automobile plants. It is said to have achieved rather phenomenal results from the point of view of cutting ability combined with long tool life.

Machine Molded

Complete mechanization of the back-breaking foundry operations is of comparatively recent origin. But it has taken strong hold in the foundries serving the automotive industry. Foundrymen will welcome the new wire-o-bound bulletin just issued by Tabor on the variety of foundry equipment recently developed by this company. It will look good in your library and we'll be glad to get you a copy.

Battery Trucks

Shipments of electric industrial trucks and tractors for the first quarter of 1936, as reported by the Department of Commerce, increased 56 per cent over those made during the corresponding period a year ago. This continues a greater-than-average upturn maintained since 1932.

Ground Thread

Current issue of *Tool Tips* shows some automotive applications of the new Ex-Cell-O precision thread grinder. Among the parts that may be improved by precision grinding are the following: drive pinion, valve adjusting screws, aircraft engine valve, con rod bolt, clutch adjusting nut. These parts are in regular production and in general the thread is ground directly from the solid. Production runs from 16 per hour for drive pinions to 40 per hour on con rod bolts.

J. G.

Salvage Scrap

Jack Brussel has done a remarkable job of factory organization at Federal Mogul. If you have been through the plant before he got on the job, it will amaze you to see what has been accomplished. The changes started with a rather simple-sounding philosophy developed by Jack during his many years of factory management. The idea is to start with the scrap pile. We all know that with good management and the right techniques, the percentage of scrap or other rejects should be a very small quantity. He starts, then, with an analysis of scrap and runs down the high percentages. That's the beginning of a systematic study of every operation. Suffice it to say that productivity has been multiplied many times over, costs scaled down, and yet the income of the workers is much greater than ever before.

On Metals

The fourth humanized booklet on technical and scientific matters of public interest has come out of the technical data department of General Motors Research. This one bears the title "Metallurgy and Wheels," and, as the name implies, it deals with the fascinating subject of metals and their treatment. It is replete with historic lore and legend. But plunges without pause into methods of steel production, development of alloy steels, and the treatment of metals for automotive use. The booklet is for the metallurgist, for the engineer, for the small boy, for the

car owner. We recommend it and will be glad to get you a copy.

Cone Worms

A series of tests are now being conducted on rear axle cone worm gears to determine maximum load capacity. This series of tests is being conducted with 3-in. center distance worm sets, having a ratio of $4\frac{1}{4}$ to 1. So far the tests have progressed to the point where the gears have operated continuously at 720 r.p.m. for 8 hr. under an input torque of 275 ft.-lb. without noticeable wear, etc. This compares with an A. G. M. A. worm gear rating for this size, ratio, etc., of 15.25 ft.-lb.

The Elements

St. John X-Ray Service has just issued a little folder packed with mighty valuable information. It is a new table compiled for the benefit of chemists and particularly those men who are concerned with x-ray analysis of materials. The table lists the 92 known elements, giving the usual physical constants plus the following data: crystal system, unit cell size in Angstrom units, and wave length in A.U. No laboratory will want to be without this handy little table. Ask us for it.

New Metal

A new cutting metal falling between cast and cemented types as to general characteristics is reported to have been undergoing intensive development for the past two years in one of the largest

MANUFACTURING
MANAGEMENT
METALLURGY

The Forum

(Continued from page 58)

writer to believe that such a viewpoint cannot be correct, especially because the opinions of equally unbiased owners agree with our own.

Perhaps because of the fact that women now have a marked influence upon the selection of automobiles may account for over attention to relatively unimportant details, to the inevitable scamping in quality of essentials dealing with engineering. This statement also will be indignantly refuted by the manufacturers, nevertheless, much time, effort and ingenuity that is uselessly expended in concealing upholstery fasteners and creating lines and curves that violate good taste might be far better employed in devising improvements to essential mechanisms that have a way of requiring frequent visits to the service station.

As an example let us select a specific example of what personal experience has taught the writer to recognize as a deliberate surrender of sound engineering principles to the meretricious absurdity of momentary fashion, namely the monstrosity now passing current as a radiator grille. What was once a thing of some protective value, possessing such beauty as intrinsic merit can afford, has now degenerated into a relatively brittle gimcrack, adding parasitic weight, but little protective value, hampering service, adding to original cost and, further, costing car owners living in cold climates thousands of dollars yearly.

To view the almost pathetic attempts of drivers of vehicles so equipped, to partly cover this useless contraption with unsightly cardboard or other makeshift and troublesome shields that have to be varied in opening according to fluctuations of the thermometer, is a sad commentary upon the mentality of the engineering profession that sponsored the adoption of this catch-penny enticement to buy a new model.

If an engine could always be maintained at best operating temperature, carbon deposits due to the over richness of mixture necessary for starting would be reduced, dilution of crankcase oil minimized, wear, through use of cut lubricant, greatly reduced and decided economies both in fuel and oil consumption effected. Incidentally there would be less strain on the already overloaded battery and starting mechanism as well as better engine performance that is lacking until the engine attains its normal operating temperature.

Obviously the next best thing to this highly desirable condition consists in having hood louvres, capable of being opened in warm weather and closed at

When you want something **BETTER**... go back to *high speed*

RED CUT COBALT
for example

will give maximum production where any or all of the following conditions exist deep cuts, fast speed, hard or scaly material. And top production records are attainable without expert manpower

VANADIUM-ALLOYS STEEL CO.
LATROBE PA.

low temperatures, in conjunction with a radiator shutter regulating the amount of cold air entering the radiator. A simple and efficient combination hitherto appearing in the best designs but now in the discard for no good reason.

Cooling systems that include a thermostatic by-pass as an integral part of the engine, the elements of which lie beneath the coolant top level and inside, inaccessible without removal of some part sealing the system from leakage, are but another indication of a complete lack of consideration upon the

part of engineers or manufacturers for what the car owner does desire.

There is no objection whatever to thermostatic controls for radiator shutters when the actuating arm is outside and accessible, because in the event of failure of the element, the adjustment of two nuts may be effected by anyone, as a roadside repair, in the space of two minutes and will enable the owner to drive home without overheating his engine, nor even overcooling it.

If the car manufacturers really wish to ascertain what the public desires let them individually drive and service

their cars and compel their engineers to do likewise before placing a new model upon the market. Less consumer research with more common sense in automobile design would be the result.

PAUL LEO.

Formula for Volumetric Efficiency

Editor, AUTOMOTIVE INDUSTRIES:

About the time this reader gets decided on how to properly correct engine output for atmospheric conditions, along comes some new idea, backed with convincing test results, and upsets everything.

In the article on Volumetric Efficiency by Messrs. Minter and Finn in *Automotive Industries* the volumetric efficiency E was defined as

$$E = \frac{100V}{V_d}$$

where V is the volume of air drawn into the cylinder at a pressure p_2 of the atmosphere, and V_d is the cylinder displacement. This was shown to vary as

$$E = K_1 \sqrt{p_2} - K_2 p_2$$

and values of E thus computed were listed in Table II of the article.

Taking two sample figures, the volumes at ground and 20,000 ft. vary in the ratio 86/77.4. However, as E so defined is the per cent by volume at each pressure, it is necessary to multiply this ratio by the ratio of the densities to get the ratio of the weights of air drawn into the cylinder. The ratio of weights is therefore

$$\frac{86}{77.4} \times \frac{74.5}{36.1} = 2.30$$

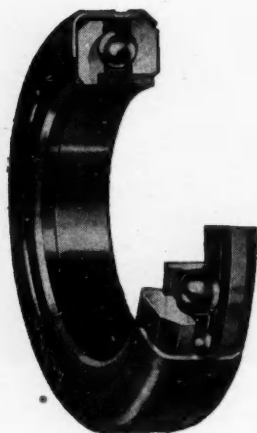
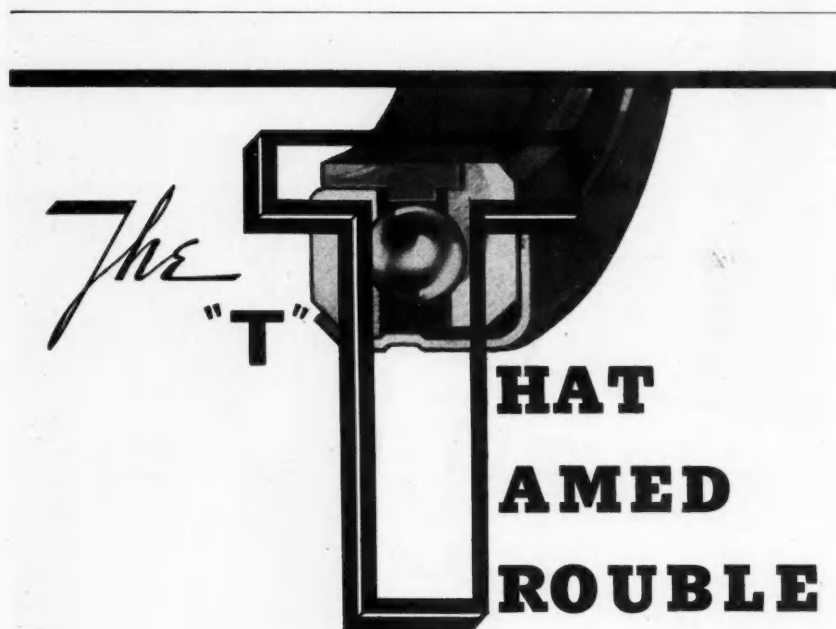
The following is quoted from N. A. C. A. Report No. 426: . . . "the indicated power of an engine at altitude has been demonstrated to be linearly related to dry air pressure. . . . The maximum obtainable indicated power of an engine under any conditions is directly proportional to its mass rate of consumption of oxygen under these conditions." From these statements it follows that the weight of air consumption varies as the first power of the air pressure.

In the above example the ratio of weights would be

$$\frac{74.5}{36.1} = 2.06$$

There is thus quite a discrepancy between the ratios of weights computed on these two bases, although each method is well backed up with experimental evidence.

O. F. ZAHN, JR.



IN this unique T-shaped ball retainer rests the answer to the automotive industry's preference for the new Aetna "T" Type Clutch Release Bearing. Made of impregnated bronze and with the original lubricant imprisoned for "life" it obviates provisions for lubrication and assures a long, quiet life.

But, most important, it maintains a permanently true pitch line between raceways, thus abolishing the punishing eccentric thrust that accounts for much of the trouble characteristic of ordinary thrust-type clutch release bearings.

To the engineers who haven't yet adopted this better bearing, it must be significant that over a million 1935 cars and trucks have proven its superiority through the indisputable tests of time and actual use. Write for engineering information.

AETNA

BALL BEARING MFG. CO.

4608 Schubert Avenue
CHICAGO, ILLINOIS

DETROIT OFFICE
7310 Woodward Avenue

Horizons of Business

(Continued from page 55)

A Contrast in Power

The power exercised by the Institute is passive and defensive. The power sought by the C.I.O. and the A. F. of L. is active and coercive. The Institute is not attempting to regiment the labor relations of the industry. It is not insisting that every worker belong to a company union or that every plant shall forbid its employees to join an outside union. It does insist that membership in such a union shall not be made the condition of employment in its plants. The drive to organize the steel industry is a large scale attempt to create a condition under which no man may hold a job, no matter what his merits as a worker may be, unless he belongs to an outside union.

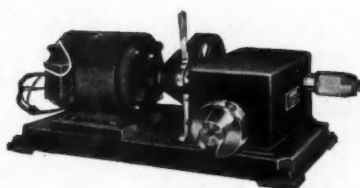
This is not an unfounded assumption. The logic of organized labor's position makes any other conclusion impossible. If a job, its pay and other conditions are in no way related to membership in a union, why should a worker pay a dollar a month to such a union? How can labor leaders maintain the vassalage of workers if each worker is free to pay or refuse the dollar a month necessary to buy groceries for the boys who do the talking.

Freedom Versus Regimentation

If regimentation means the application of uniform and inescapable rules then the organization of an industry be it by the C.I.O. or the A. F. of L. is regimentation. If the Institute opposes the application of such rules it is difficult to see how efforts directed to that end can be termed regimentation. The labor policies urged by the Institute and those implied by the necessities of the C.I.O. and the A. F. of L. have no more in common than black and white. To say that the public must choose between regimentation by the Institute, the C.I.O. or the A. F. of L. distorts the facts and confuses the issue. The issue is not the particular brand of regimentation to be imposed upon the steel industry but rather freedom versus regimentation.

New Keystone Machine Produces Close Fits

A new Keystone reaming, honing and burnishing machine, designed for finishing piston-pin bearings, connecting-rod bushings and king-bolt bushings, has just been announced. The machine is said to employ a new method of finishing and to produce extremely accurate results.

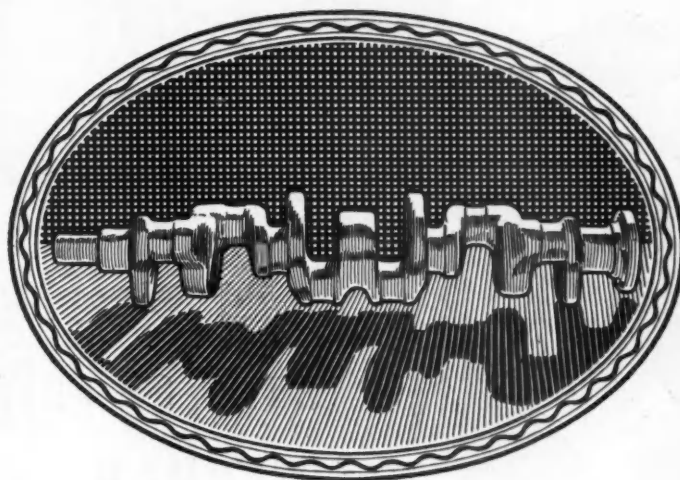


Power from a $\frac{1}{2}$ -hp. A-C motor drives the reamer and burnishing shaft at 60 r.p.m. and the hone shaft at 600 r.p.m. Either shaft is operated independently of the other. The machine will handle any work up to $1\frac{1}{2}$ in. in diameter.

A new folder completely describes both the machine and the method employed and is available from the manufacturers, Keystone Reamer & Tool Co., Millersburg, Pa.

Shrinkage Reduced in Self-Curing Rubber

The Self-Vulcanizing Rubber Company, Inc., Chicago, Ill., announces an important development and refinement in its plastic rubber. The shrinkage of



Forgings with a background—

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THE CRANKSHAFT MAKERS
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its cold, self-curing process has been reduced to about one-third that heretofore common in the application of rubber coatings and linings.

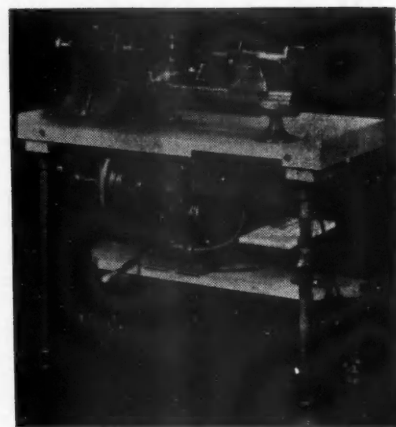
Now the shrinkage of SELFVULC Plastic will not exceed 8½ per cent. This means increased coverage, a thicker finished coating, at no increased cost. It also means decreased internal strain in the rubber and that means longer life.

The improved plastic is thus more economical and more practical for all rubber coating or lining work, and espe-

cially for rebuilding the surfaces of conveyor belts which have been worn down by the abrasion of the materials carried.

Hardinge Bench Lathe Features High Speeds

Extreme accuracy and high-spindle speeds feature the new Hardinge Precision Ball Bearing Bench Lathe. "Pre-loaded" bearings in the headstock automatically secure the proper initial



Hardinge Bench Lathe

load for correct spindle rigidity and require no further attention.

Five models are available as well as a number of interchangeable electrical drive units which supply up to eight forward and eight reverse spindle speeds ranging from 230 to 3900 r.p.m. Complete descriptive literature is available from the manufacturers, Hardinge Brothers, Inc., Elmira, N. Y.

New Western Felt Line Features duPrene Seal

Western Felt Works, Chicago, Ill., has issued an interesting bulletin describing applications of a new line of felt products for automotive construction. The first of these is Resistofelt—consisting of two layers of felt with a center strip of duPrene synthetic rubber. This material is used for washers as a grease seal on revolving shafts. An application for truck rear wheels is described and illustrated.

Another novel material is Westofelt-pal, a strong flexible gasket material for use where there are no high temperature conditions. Gaskofelt is a felt material impregnated with duPrene and is said to make an excellent gasket material where high quality and strength are required. One application of this gasket is for tractor housings where the contour is of irregular form.

Wickes Automatic Lathe For Heavy Duty Shafts

The Wickes Model "DA-8" Automatic Duplex Type Crankshaft Lathe is especially designed for the machining of heavy Diesel and tractor-type crankshafts. Once the crankshaft is chucked in the machine and the starting button depressed, the entire cycle is automatic and provides rapid traverse of tool to cutting position, coarse cheeking feed, fine turning feed, dwell (in which the tools are held to clean up the cut),

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diameter stop, and rapid traverse to unload position.

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publication can be obtained from the Superintendent of Documents, Washington, D. C., for 5 cents.

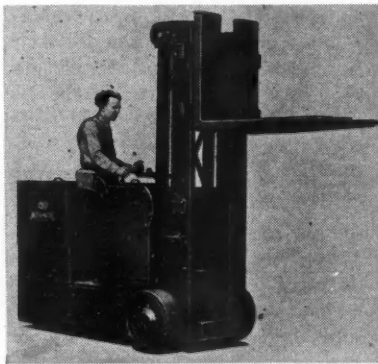


**Wickes Automatic
Lathe for heavy
duty shafts**

supplies the power, and net weight including electrical equipment is 28,000 lb. Wickes Brothers, Saginaw, Mich., are the manufacturers.

New Tiering Fork Truck Saves Space in Storage

A new Automatic, Model "THTF," heavy-duty tiering fork truck has recently been announced and is capable of handling loads of 10,000 lb. up to 72 in. in length. Drive is on the front



Automatic tiering fork truck

wheels for greatest traction and its steering radius is sufficiently short that it can be operated in intersecting isles only 94 in. wide.

Its high stacking feature in addition to extreme maneuverability permits greater capacity for any given storage space. Automatic Transportation Co., 101 W. Eighty-seventh St., Chicago, is the manufacturer.

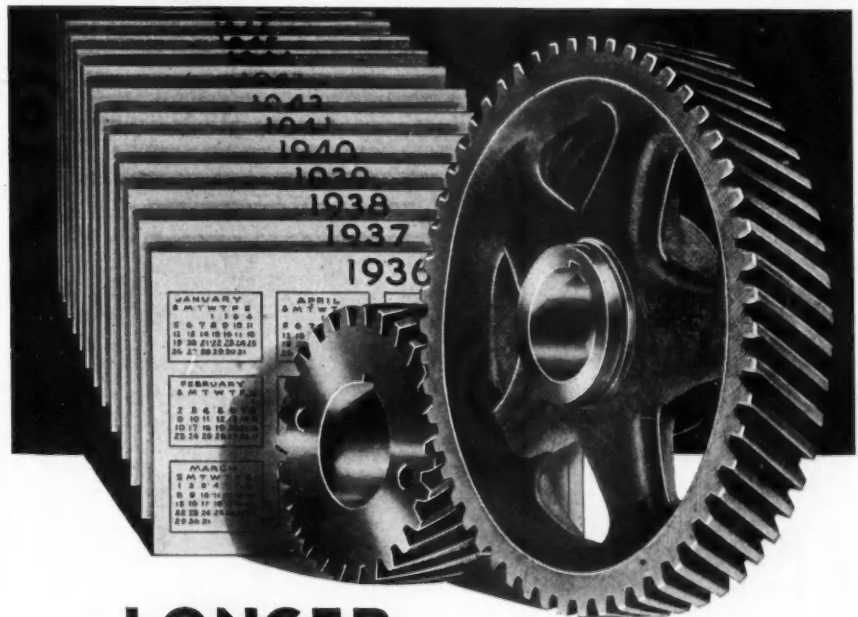
Simplified Practice in Taper Roller Bearings

A NEW simplified practice recommendation (N67-36) covering taper roller bearings has just been issued by the National Bureau of Standards of the U. S. Department of Commerce. The new edition was made necessary by changes in the dimensions of one of the bearings in the medium series. This change was adopted by the Standards Committee of the S.A.E. in 1935. Copies of the

Foxboro Remote Valve For Central Control

For the purpose of centralizing all fluid controls on a given operation, the Foxboro Co., Foxboro, Mass., has brought out a remote valve control which brings the control of any number of valves to a single panel. In addition to convenience, a feature of the system is the extreme accuracy with which adjustments can be made, in many instances changing a flow by only 1 per cent. The exact setting is gaged on the instrument.

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Resilience, the result of advanced design, causes Celoron "Spoke" Timing Gears to outlive gears of conventional design by as much as 50%. Celoron "Spoke" Timing Gears are strong—their material fatigue safety factor is five. In many cases they outlive the motor in which they are installed. Celoron "Spoke" Timing Gears are silent in operation—their "spoke" design decreases sound transmission, and breaks up resonance.

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CONTINENTAL-DIAMOND FIBRE CO.
Newark, Delaware

After 100 Years

(Continued from page 49)

for use in any future suits that might be brought under the patent and that the testimony already taken should be held available for presentation in such suit, but no further suit was ever brought. In fact, it was announced by representatives of the rim corporation that Perlman had retired from all direct connection with the firm (of which he had been president). Perlman had maintained that although he applied

for patent only in 1906, he had completed his demountable rim in 1903 and had fitted it to a Royal Tourist car which he owned at the time. This early date was essential to the maintenance of his claim for a basic patent, because demountable rims had been used on racing cars prior to the date of application. The exact story of the reasons for the withdrawal have never appeared in print so far as the writer

is aware, but it was said at the time that counsel for Firestone, which included the famous criminal lawyer Martin W. Littleton, had unearthed evidence which disproved the claim that Perlman had completed his rim in 1903.

The Sliding Gear Transmission Patent

The sliding gear transmission, as widely used for automobiles up to a few years ago, was covered by two patents issued to Leonard H. Dyer in 1900. One of these patents, No. 657,650, issued Sept. 11, 1900, covered the H-slot or selective shift, while the other, No. 662,401, issued Nov. 27, 1900, covered the direct drive. Like Selden, Dyer was a patent attorney, who practiced under the firm name of Dyer & Dyer. Early in 1906 suits were filed against the Lozier Motor Company, a member of the Association of Licensed Automobile Manufacturers, for infringement of both patents. It is of interest to note in this connection that the first of these patents, covering the H-slot control, described a belt drive for automobiles, a single belt connecting two "cone" pulleys. The transverse motion of the shift lever in the H-slot was used to shift the belt from one step of the cone to another, and the fore-and-aft motion, to tighten the belt. However, the claims were so skilfully drawn that they also covered the use of an H-quadrant or "gate" in connection with selective control of sliding gear transmissions. Claim No. 9 of patent No. 657,650 read as follows:

"In an automobile vehicle a transmission gearing therefor, the operating handle therefor, the fixed guide plate having recesses therein, substantially as set forth."

This claim covered the control used with the early types of selective sliding-gear transmission, in which the control lever was slid sideways in order to pick up one or another of two or three sliding bars. Mounting of the shift lever on a spherical support, which did away with the H-slot or quadrant, came at a later date.

Claim No. 12 of patent No. 662,401 read as follows:

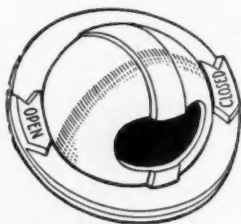
"In an improvement in gearing, two shafts parallelly arranged, a gear rigidly fastened to one shaft, a second gear in mesh with first gear, but free to rotate about its supporting shaft, a clutch member upon said gear, a third gear rigidly supported upon one of the shafts, a loose gear adjacent thereto, normally inoperative intermediate mechanism interposed between said gear and its supporting shaft, a gear keyed to the other shaft but capable of lateral or endwise movement thereon, a clutch member upon one face of the fourth gear and a projection or hub n' upon

WHAT'S NEW IN

Plastics?

THIS MONTH: Air Vent Nozzles, Brakes and Clutches, Heater Housings

Air Vent Nozzles:



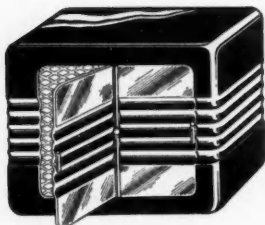
Individual nozzles of this type direct and regulate air to suit the whims of each passenger . . . zephyr-like for Grandmother, gale-force for Junior. Developed for use on trains and planes . . . they should find ready acceptance on cars and buses. The mounting ring and spherical vent are molded of Durez in colors to match interior trim. The permanent Durez finish won't dull, scratch or chip. Indicating-arrows and directions can be handled right in the mold.

Brakes and Clutches:

Durez resins are widely used for impregnation of clutch facings, brake linings and brake blocks. These resins build up strength, resistance to water, oil, heat, and eliminate chatter and squeaking. Durez impregnated brake linings show longer wear and a more uniform friction coefficient.



Heater Housings:



For hot-water heaters where housing bears no load, get quotations on molded Durez instead of plated stampings. When well-designed, they're richer and warmer-looking than metal. Scuffing and kicking can't scratch or chip them. Stamped metal fins can carry the same motif—black flutes for instance—as the molded housing, with remainder of fin chromium. Many other decorative possibilities.

SAMPLES of the suggested moldings are not generally available. However, samples of resins used for impregnation of brake linings, clutch facings, brake blocks, etc., will be sent on request. We are glad to consult with interested manufacturers on material selection and designs of all new Durez applications. Write General Plastics, Inc., 27 Walck Road, North Tonawanda, N. Y.

Choice of the Motor Industry

DUREZ • Plastic Materials

the opposite face, substantially as set forth."

This described the direct drive as commonly used in sliding-gear transmissions. Renault in France had claimed invention of the direct drive; however, he did not engage his gears by endwise motion but by a radial motion. Moreover, it was found that while he had applied for a patent in this country, he had allowed his application to lapse. The Association of Licensed Automobile Manufacturers therefore considered it expedient to acquire the Dyer patents and to issue licenses to its members. Later it sold the patents back to the inventor for \$75,000, and while the original purchase price is not known it is believed that this involved a handsome profit to the Association. At the time the patent was returned to Dyer there were more passenger car manufacturers outside than in the A.L.A.M., and there were also a large number of truck manufacturers. The patent was generally recognized and Dyer issued shop licenses to practically all of the makers outside the A.L.A.M.

Parsons Tire-Chain Patented in 1903

Another important early patent was the Parsons tire chain patent, which was issued to Harry Parsons, a British engineer, on March 24, 1903. It is, of course, well known that motor-propelled vehicles have difficulty in getting sufficient traction on slippery roads, and particularly when the roads are covered with snow and ice. Traction engines with steel tires were provided with strakes or cleats, but these were not applicable to rubber tires. Some use was made of rope wound around the tires, but the rope wore away very rapidly. More durable anti-skid devices were urgently needed, but if these had only a limited contact with the tire there was danger of injuring the tire. A license under the Parsons patent (U. S. Patent No. 723,299) was issued to the Weed Chain Tire Grip Company of Bridgeport, Conn., which originally had been formed to manufacture an anti-skid device invented by Harry S. Weed. Apparently the Parsons invention antedated that of Weed.

The Parson non-skid chain consisted of flexible (chain) side members and a series of cross members. One end of each side member was provided with a connecting hook. When the assembly was placed over the tire and the ends of the side members were connected together by the hooks, the side members were located on opposite sides of the tire quite close to the rim. Only the cross chains, which were fairly closely spaced, came in contact with the road. The whole assembly was comparatively

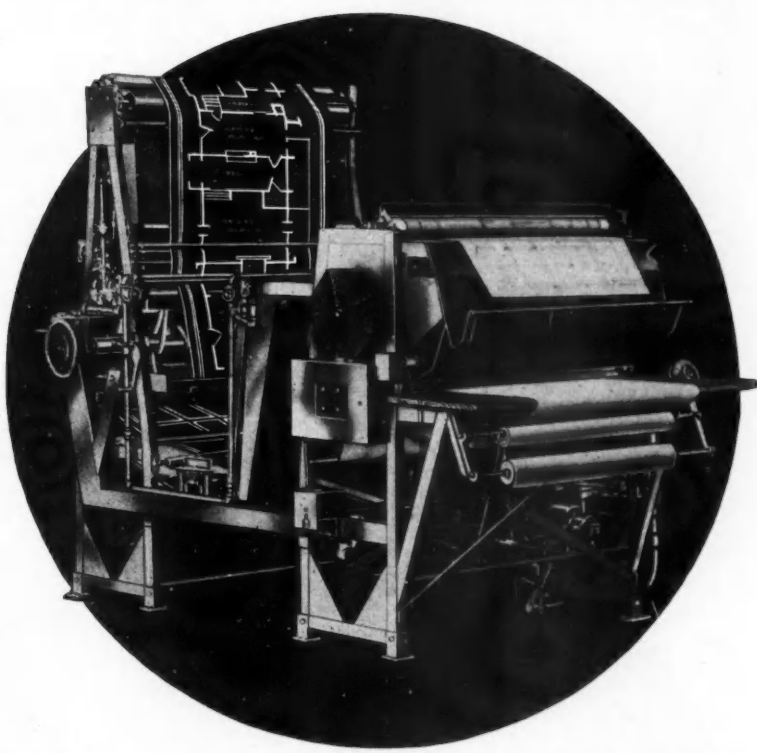
loose on the tire and therefore free to change its position on the latter, which prevented localization of wear on the tire tread.

There was very extensive litigation under the Parsons patent. The Weed Chain Tire Grip Co. brought suit against the Excelsior Supply Co., and early in 1910 Judge Sanborn of the U. S. District Court at Chicago rendered a decision in favor of the complainants. This decision was upheld by the Circuit Court of Appeals and an attempt of defendant to carry the case to the Supreme Court failed. The

length to which this litigation was carried is illustrated by the following statement of one of the judges of the Court of Appeals for the Second Circuit, which handled the case:

"If it is possible in a patent cause to reach a stage where everything that has the remotest bearings on the issues has been said and where ever question relating to the validity of the patent has been decided, this would seem to such a case All the important questions have been decided over and over again by the unanimous judgment of 24 tri-
(Turn to page 70, please)

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bunals, six of them being courts of appeal. We have been unable to find a single vital proposition advanced at this hearing which has not been decided against the defendants over and over again."

Another automobile accessory which was the cause of a great deal of patent litigation was the electric motor horn. The conventional signaling device during the early years of the industry was the bulb horn, consisting of reed horn with a rubber bulb which could be com-

pressed by hand to sound the horn. This was somewhat unsatisfactory because of the limit to the volume of sound that could be produced, the somewhat awkward operation, and the perishable nature of the bulbs. Miller Reese Hutchison, an inventor who had been associated with Edison in the early years of electrical development, on May 25, 1909, had three patents on a new type of signaling device—or noise machine as he was wont to call it—issued to him, U. S. Patents Nos. 923,048, 923,-

049 and 923,122. One of the claims described the invention as follows:

The Electric Motor Horn Litigation

"In an alarm or signaling apparatus of the class described, a horn or resonator, and a diaphragm in combination with a rotary member and diaphragm-actuating means actuated thereby and adapted to positively displace said diaphragm in one direction, and then to permit elastic movement thereof, and high-speed means for driving said rotary member at such rate that the displacements and the elastic movements correspond to a frequency of said horn or resonator."

Lovell - McConnell Manufacturing Company of Newark, N. J., became exclusive licensee under these patents and marketed the Klaxon horn, manufactured in accordance with them. It was an instant success and found many imitators. Suits for infringement were brought right and left, the most important being that against the Automobile Supply Manufacturing Company of Brooklyn, N. Y., manufacturers of the Newtone horn. At first all decisions favored the Lovell-McConnell Company, but in June, 1914, the U. S. Circuit Court of Appeals for the Second Circuit reversed the decree of the District Court of the Eastern District of New York. It was held that the Hutchison patent had been anticipated by A. N. Pierman who had invented a signaling or alarm device for bicycles disclosed in U. S. Patent No. 620,958. It was similar to Hutchison's horn in that in it, too, a diaphragm was set vibrating by a rotating cam. It had no electric motor, but that was of no importance as far as this case was concerned. The decree held that the principal claims of the Hutchison patent were invalid because of the Pierman patent and those not invalid were not infringed.

There have been many other important patent cases involving features widely used in automobiles, such as those relating to the vacuum fuel feed, automobile bumpers, the starter drive, etc. It would lead too far to go into details of these cases here. In closing it may be appropos to refer to two threatened suits that were never brought. The first was in connection with the balloon tire, the second with the conventional ignition unit of battery ignition systems. It is to be presumed that in both of these cases the owners of the patent realized that it would not withstand the severe attack to which it would be subjected in court.

Background FOR PERFECT LUBRICATION

The above illustration is an electron diffraction pattern identifying a graphoid surface on cast iron. + Modern research has not only proved through electron diffraction methods the presence of the graphoid surface, but has gone further and shown that friction so aligns the graphite particles on metal as to safe-

guard "shock points" against wear-producing metal-to-metal contact. Further, this surface, formed with oils which contain "dag" colloidal graphite, has greater attraction for oil than does bare metal, minimizing oil film rupture. Clearly, this surface provides a background for perfect lubrication. + Write for booklet.

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